Section C Statement of Work

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C.1 Introduction

The scope of this Contract with U.S. Department of Energy (DOE), Richland Operations Office (RL) is to provide waste treatment and immobilization services at fixed-unit prices using *privatized facilities* — a Contractor-developed, -financed, -constructed, -owned, -operated, and -deactivated waste treatment and immobilization system for Hanford tank waste.

The multiple parts of this Contract are identified as Part A, Part B-1, and Part B-2.

Part A — a 20-month period to establish the technical, operational, regulatory, and financial elements required by privatized facilities to provide waste treatment services at fixed-unit prices. The 20-month period is divided into: a 16-month period for the Contractor to provide Part A deliverables and a four-month period during which the Part A deliverables will be reviewed and DOE will determine whether to authorize the Contractor to perform Part B. During performance of Part A, the Contractor(s) selected for CLIN 001 will develop a solution for Low-Activity Waste (LAW) services only; the Contractor(s) selected for CLIN 002 will develop two parallel solutions: LAW services only; and Low-Activity and High-Level Waste (HLW) services.

Part B-1 — the period to: 1) optimize the LAW and HLW waste treatment and immobilization system, mitigate risk, and reduce contingencies in the waste treatment and immobilization system defined by the Contractor in Part A; 2) revise the technical, operational, regulatory, and financial elements of the waste treatment and immobilization system; 3) provide firm fixed-unit prices for waste treatment services; and 4) perform all contractor activities necessary to reach financial closure for privatized facilities. The period of performance for Part B-1 is established in Section F, *Deliveries or Performance*.

Part B-2 — the period to complete design, construction and permitting the privatized facilities, provide waste treatment services at firm fixed-unit prices, and deactivate the privatized facilities. During Part B-2, three LAW feed envelopes and one HLW feed envelope will be provided for treatment. DOE will order a minimum quantity of waste treatment services during Part B-2 and may order additional treatment services. When no further waste treatment services under this Contract are required, DOE reserves the unilateral right to: 1) take possession of the privatized facilities in accordance with Clause H.34, *Government Option to Take Title to Treatment Facility*, or 2) direct the Contractor to deactivate all privatized facilities.

During Part B-2, the Contractor shall commission, by the target date in Section F, *Deliveries or Performance*, a high-level waste treatment and immobilization service capable of treating Envelope D feed. A minimum order quantity of 600 canisters of immobilized high-level waste shall be treated and immobilized by the target date in Section F, *Deliveries or Performance.* The Contractor shall also commission, by the target date in Section F, *Deliveries or Performance*, a low-activity waste pretreatment service capable of treating 1300-1600 units of Envelope B feed, prior to commencement of LAW vitrification services. The Contractor shall also commission, by the target date in Section F, *Deliveries or Performance,* a LAW treatment and immobilization service capable of treating Envelope A, B, and C feeds. A minimum order quantity of 6000 units of LAW from Envelopes A, B, and C shall be treated and immobilized by the target date in Section F, *Deliveries or Performance.* The Contractor shall design, construct and operate feed receipt tankage of sufficient capacity to receive store and process LAW and HLW feed in accordance with Contract Clause H.9 “Ordering and

The *Statement of Work* is divided into seven sections: this introduction; a description of DOE interactions with the Contractor; a summary of the regulatory environment; a description of services and deliverables; standards; specifications; and interface descriptions.

C.2 Interactions with the Contractor

a. DOE has three distinct and separate responsibilities that define interactions with the Contractor:

1) As the *Customer*, DOE will purchase a waste treatment service to convert Hanford tank waste into durable forms suitable for disposal.

2) As the *Owner* of the Hanford Site and the waste to be processed, DOE will:

(a) Provide selected services, land, facilities, and equipment to the Contractor;

(b) Require Site-wide compatibility of regulatory compliance actions; and

(c) Review the Contractor's operations to ensure that accountability is maintained for DOE-owned special nuclear material and that adequate security is provided against potential acts of sabotage involving DOE-provided radioactive materials.

3) As the *Regulator*, DOE, through the DOE Office of Radiological, Nuclear, and Process Safety (Regulatory Unit), will regulate radiological and nuclear safety to ensure that the Contractor provides for and operates within the required levels of public and worker protection. The Director of the Regulatory Unit will also provide oversight of process safety but will not engage in enforcement actions for process safety.

The Occupational Safety and Health Administration (OSHA), or DOE under its authority, will be responsible for regulating non-radiological safety and health protection. Under provision 4(b)1 of the *Occupational Safety and Health Act of 1970* and Section 161(i)(3) of the *Atomic Energy Act of 1954*, DOE may retain responsibility for overseeing non-radiological worker safety and health.

b. The Contractor shall maintain full responsibility under this Contract for all Contractor activities necessary to provide waste treatment services in privatized facilities. DOE actions to evaluate, review, comment, and/or concur in any Contractor actions under this Contract, and any authorization to continue with Part B-2 of this Contract, will not impose any responsibility on the Government for the adequacy, quality, or completeness of Contractor actions. DOE actions during Part B-1 and B-2 are designed to implement Government responsibilities as the *Customer*, *Owner*, and *Regulator*.

c. DOE will use an *Integrated Process and Product Development* (IPPD) approach to manage interactions with the Contractor. DOE will use the IPPD approach to create a partnership between DOE, the Contractor, and the other Hanford Site contractors. The primary objectives of the IPPD approach are to: promote Contractor innovation and accountability for deliverables and services; facilitate communications and understanding; and link Hanford Site

interfaces to Contractor facilities. The IPPD approach will provide the Contractor with focused and timely access to the information and organizations required for the Contractor's success. As *Customer*, *Owner*, and *Regulator*, DOE will use the Contractor's processes and products to obtain the necessary information and performance assurances that DOE will need.

To implement the IPPD approach, DOE and other Hanford Site contractor representatives will organize around a framework of *Integrated Product/Process Teams* (IPTs).

The Contractor shall establish the IPTs described below and shall provide the necessary Contractor staff, administrative services, and technical support for each IPT. The Contractor may propose additional IPTs, if deemed necessary, to implement the IPPD approach. IPTs are not authorized to change the Contract; see Sections G.5, *Contract Authority*, and G.6, *Modification Authority*.

DOE will use each IPT as a primary method to formally communicate the following information critical to the Contractor's success: regulatory framework, site requirements and interface information, Hanford Site operational constraints, and identification of potential problem areas.

1) Project Management IPT:

Membership will include key DOE project management staff, a DOE Contracting Officer's Representative, Contractor staff, and other Hanford Site contractor staff. Regulators will be invited to participate as appropriate. The Project Management IPT shall be the parent IPT for all other IPTs.

The charter of the Project Management IPT is to monitor the progress of the project. The Project Management IPT will also consider issues raised direct within the IPT, or referred to it by subordinate IPTs and make recommendations to the Contractor's management and DOE Contracting Officer as necessary.

2) Safety, Health, and Environmental IPT:

Membership will include technical staff from DOE, a DOE Contracting Officer's Representative, Contractor staff, and other Hanford Site contractor staff. Regulators will be invited to participate as appropriate. The Safety, Health, and Environmental IPT will report to the Project Management IPT.

The charter of the Safety, Health, and Environmental IPT is to facilitate the development and review of safety, health, and environmental deliverables, achieve compatibility between Contractor and Hanford Site regulatory compliance actions, integrate Contractor and Hanford Site Emergency Preparedness Program and actions, and facilitate interactions with external regulators.

The Safety, Health and Environmental IPT will be the forum for discussion and resolution of issues related to work products, deliverables, responsibilities, integration, and compliance activities where joint responsibility exists for meeting the regulatory requirements of external regulatory agencies.

3) Interface IPT:

Membership will include technical staff from DOE, a DOE Contracting Officer's Representative, Contractor staff, and other Hanford Site contractor staff. The Interface IPT will report to the Project Management IPT.

The charter of the Interface IPT is to provide a single point of contact to define, control, and manage all interfaces between the Contractor and the Hanford Site, and to oversee the implementation of and revisions to the Interface Control Document for each of the interfaces shown in Figure C-1, *Privatization Functions, Inputs, and Outputs.* Figure C-1 summarizes the services, responsibilities, and interfaces between the Contractor and DOE during Part B-2. The Interface IPT will be the forum for discussion of technical scope, specifications, and standards.

During Parts B-1 and B-2, an Interface Control Document Change Control Process will be established per Standard 1, *Management Products and Controls,* to manage and control changes to the development of the Interface Control Documents. The Contractor will be responsible for configuration control. The Change Control Process shall be overseen by a representative from the Contractor, the Hanford Site contractor and the DOE Contracting Officer's Representative. The Interface IPT will be the mechanism to establish final procedures and interface design details that do not violate the requirements identified in Section C.7, *Interface Descriptions*. The Interface IPT will provide recommendations to the Project Management IPT for approval by the Contractor and DOE.

4) Business/Contract/Finance IPT:

Membership will include key DOE staff, and may include such personnel as a DOE Contracting Officer's Representative, DOE business and financial support staff, independent financial advisors, other Hanford Site contractor staff, Contractor staff, and Contractor independent financial advisor. Contractor lenders/investors will be invited to participate, as appropriate. The Business/Contract/Finance IPT will report to the Project Management IPT.

The charter of the Business/Contract/Finance IPT is to facilitate timely and successful financial closure for project financing. The IPT will: discuss financing alternatives; monitor financial programs through financial closing; analyze and evaluate changes between target and fixed-unit prices, target and final hard construction costs, target and final hard operating costs, and target

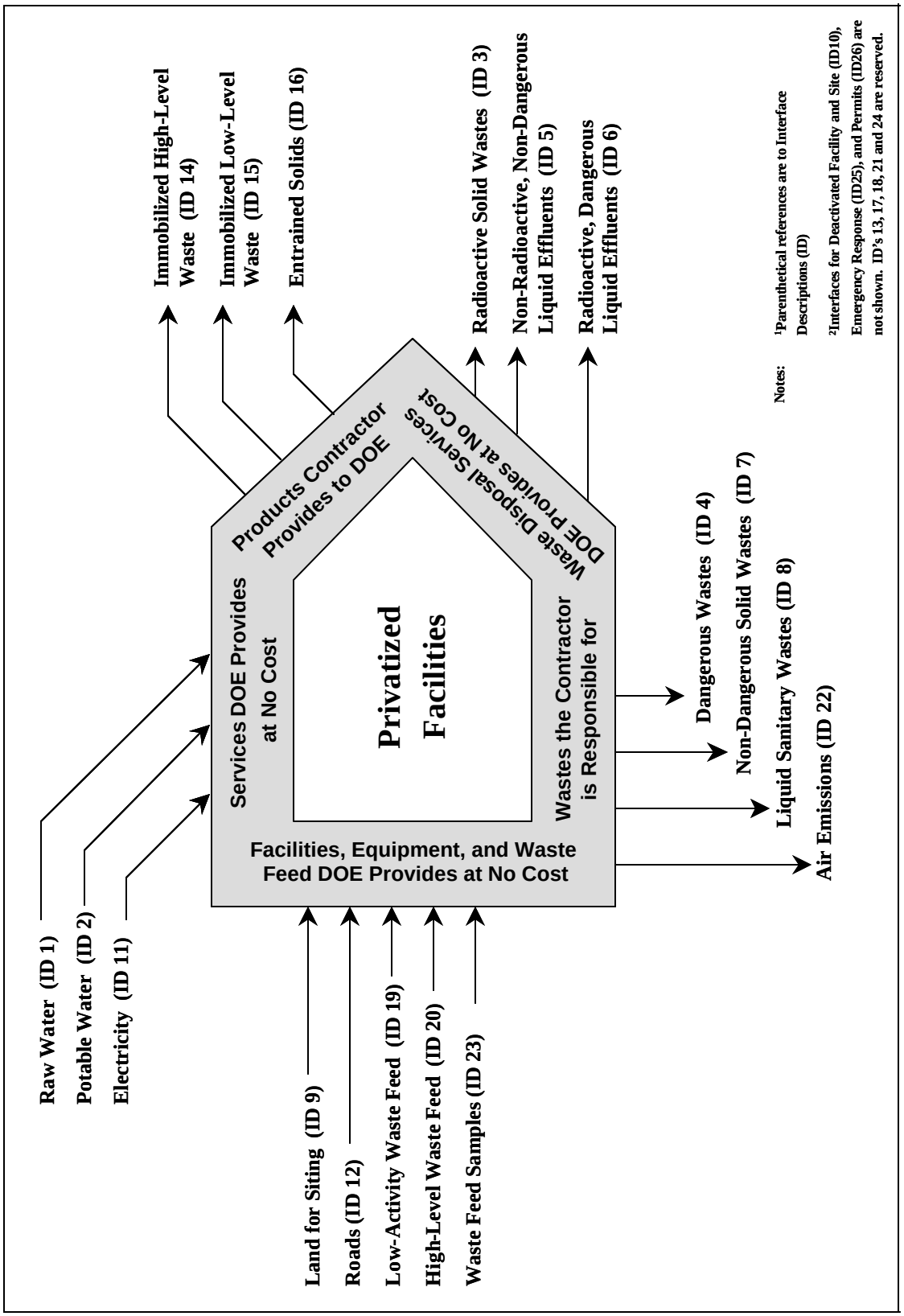

Figure C-1 ***Privatization Functions, Inputs, and Outputs***

and final equity commitments; be a forum for understanding the risk and contingency cost elements; monitor financial progress during construction through facility commissioning; and recommend any contractual changes required to achieve financial closure.

d. DOE, as the Hanford Site Owner, is responsible for fulfilling the requirements of the Hanford Federal Facility Agreement and Consent Order. The Contractor shall support all DOE activities related to defining and maintaining appropriate commitments, performance milestones and/or related provisions in the TPA. The Contractor shall also be responsible for providing to DOE TPA-related support required to provide waste treatment services under this contract.

C.3 Regulatory Environment

a. The Contractor will process DOE-owned highly radioactive and dangerous waste in privatized facilities. In order to operate its facilities within the appropriate and prudent level of controls consistent with the chemical and operational hazards and potential consequences, the Contractor shall establish and maintain a Safety, Health, and Environmental program that reflects the principles and practices of: effective radiological, nuclear, and process safety controls; effective industrial safety controls; and effective environmental protection.

The Contractor shall be responsible for the protection of: human health and the environment from radioactive chemicals, hazardous materials, and dangerous waste contamination; and non-radiological worker safety and health from conventional industrial and occupational hazards. The Contractor is responsible for providing safe and healthful working conditions for employees, subcontractors and all other persons under the Contractor's control who work in the general vicinity of the Contractor site.

The Contractor shall comply with all applicable Federal, State, and local requirements for:

1) Non-radiological worker safety and health;

2) Radiological, nuclear, and process safety; and

3) Environmental protection.

Except where regulatory authority is specifically reserved for DOE by law or regulation, or where regulatory compliance responsibility is established for DOE in this Contract, DOE will not serve as a regulator or enforce regulatory compliance requirements. Where joint responsibility for regulatory compliance is assigned by an external regulator to DOE and the Contractor, the Contractor has primary responsibility and accountability to the external regulator. Where joint responsibility does not exist, the Contractor has full responsibility and accountability to the external regulator.

DOE, as the Hanford Site Owner, is responsible for fulfilling the requirements of the Hanford Federal Facility Agreement and Consent Order. The Contractor shall support all DOE activities related to defining and maintaining appropriate commitments, performance milestones and/or related provisions in the TPA. The Contractor shall also be responsible for providing to DOE TPA-related support required to provide waste treatment services under this contract.

b. The regulatory environment for this Contract is structured into three principal areas of responsibility:

1) Non-Radiological Worker Safety and Health

The Occupational Safety and Health Administration, or DOE under its authority, will be responsible for regulating non-radiological safety and health protection. Under provision 4(b)1 of the *Occupational Safety and Health Act of 1970* and Section 161(i)(3) of the *Atomic Energy Act of 1954*, DOE may retain responsibility for overseeing non-radiological worker safety and health. The Contractor shall comply with all applicable Federal, State, and local safety and health regulations, including those of the Washington Industrial Safety and Health Administration (WISHA) and OSHA.

2) Radiological, Nuclear, and Process Safety

DOE will regulate radiological and nuclear safety through a specifically chartered, dedicated *Regulatory Unit*. The Director of the DOE Regulatory Unit serves as the formal point of contact for radiological, nuclear, and process safety regulation. The Director will provide oversight of process safety but will not engage in enforcement actions.

3) Environmental Protection

(a) DOE will be responsible for meeting its compliance obligations under the *National Environmental Policy Act* (NEPA). The Contractor shall provide materials related to Contractor activities to support these compliance efforts.

(b) The U.S. Environmental Protection Agency (EPA), State of Washington Department of Ecology (Ecology), and/or the Washington State Department of Health (WDOH) will regulate radioactive and non-radioactive air emissions. The Contractor shall integrate its operations and requirements into the Hanford Site-wide air compliance framework, including the Hanford Air Operating Permit.

(c) EPA and Ecology will regulate and administer all permits for treatment and storage operations under the *Resource Conservation and Recovery Act* (RCRA) and the *State of Washington Hazardous Waste Management Act*. All RCRA/Dangerous Waste permit applications shall be signed by the Contractor and will be signed by DOE when required.

(d) Ecology, DOH, and/or local agencies will regulate liquid sanitary waste discharges to the soil column at the Contractor's site. No other types of liquid discharges or solid waste disposal will be allowed to the soil column.

(e) The U.S. Department of Transportation (DOT) and Ecology will regulate off-site transportation of radioactive and dangerous wastes. On-site transportation may require coordination with other Hanford Site contractors.

(f) Where required to comply with regulatory requirements or other provisions of this Contract, environmental compliance activities shall be integrated with those of DOE and other Hanford Site contractors.

(g) EPA regulates certain substances under the *Toxic Substance Control Act* (TSCA). TSCA regulations are not currently applicable to the treatment of Hanford tank waste. In the event that TSCA regulations are required, this would result in an uncontrollable circumstances per Clause H.28, *Uncontrollable Circumstances*.

C.4 Description of Services and Deliverables

a. This Section identifies specific deliverables for the Contract. Specific requirements for the deliverables are established in Sections C.5, *Standards*, C.6, *Specifications*, and C.7, *Interface Descriptions*. Best commercial practices shall apply where a *Standard*, *Specification*, or *Interface Description* is not provided. All data item deliverables shall be submitted in accordance with Section G.9, *Reports and Drawings*.

1) Part A deliverables are identified in paragraph C.4.1;

2) Part B-1 deliverables are identified in paragraph C.4.2; and

3) Part B-2 deliverables are identified in paragraph C.4.3.

The specific deliverables developed and submitted by the Contractor for DOE action during Part B-1 and Part B-2, represent only part of the overall Contractor scope of work to be performed under this Contract.

b. During Part B-1, the Contractor shall: 1) optimize the waste treatment and immobilization system, mitigate risk, and reduce contingencies in the waste treatment and immobilization system defined by the Contractor in Part A; 2) revise the technical, operational, regulatory, and financial elements of the waste treatment and immobilization system; 3) provide firm fixed-unit prices for waste treatment services; and 4) perform Contractor related activities necessary to reach financial closure for privatized facilities. The period of performance for Part B-1 is established in Section F, *Deliveries or Performance*.

The Contractor shall apply a professional standard of care in the preparation of deliverables during Part B-1 of this Contract. Such deliverables shall clearly represent and report the performance of the waste treatment system and reflect the status of design and other related activities at the completion of the design work undertaken in Part B-1.

Failure of the Part B-1 work to demonstrate specified performance of the waste treatment system, shall not be a basis for finding a deficiency in, rejecting, or issuing a termination for default for a particular deliverable or work product.

Further, in the event that the Contractor is unable to obtain approval from a regulator or other authorizing agency during Part B-1, this shall not be a basis for finding a deficiency in, rejecting, or issuing a termination for default for a particular deliverable or work product, provided the deliverable meets the published requirements applicable to the deliverable, work product or application.

All technical, regulatory, and business and finance deliverables and work in this project shall be consistent.

c. In Part B-2, the Contractor provides waste treatment services in privatized facilities at fixed-unit prices. Part B-2 is divided into services that shall be provided by the Contractor, and services that will be provided by DOE. Figure C-1, *Privatization Functions, Inputs, and Outputs*, summarizes the services, responsibilities, and interfaces between the Contractor and DOE during Part B-2. Services provided by the Contractor are:

1) Receive LAW feed (defined in Specification 7, *Low-Activity Waste Envelopes Definition*) and HLW feed (defined in Specification 8, *High-Level Wastes Envelope Definition*) through DOE provided transfer lines to an interface point described in Interface Description 19 and 20 respectively.

2) Reserved

3) Treat and immobilize the low-activity fraction and any LAW entrained solids not returned to DOE (per paragraph C.4.c.4) and provide the final waste products described in Specification 2, *Immobilized Low-Activity Waste*, for return to DOE;

4) In accordance with Clause H.9.c, *Entrained Solids Separated from Low-Activity Waste (Envelopes A, B, and C)*, return solids separated from LAW feed in the form of an intermediate waste product (Specification 3, *Entrained Solids*), or immobilize the solids as either HLW (Specification 1, *Immobilized High-Level Waste*) or LAW (Specification 2, *Immobilized Low-Activity Waste*). If immobilized as LAW or HLW, the solids separated from the LAW feed shall count toward satisfying the minimum order quantity of the applicable feed;

5) Reserved

6) Treat in accordance with Specification 12, *Number of HLW Canisters per Batch of Waste Envelope D*; immobilize the HLW feed and radionuclides separated from LAW feed and any HLW Entrained Solids not returned to DOE (per paragraph C.4.c.4); and provide the final waste products described in Specification 1, *Immobilized High-Level Waste*, for return to DOE;

7) Store the pretreated LAW resulting from HLW slurry processing as an intermediate waste product until the low-activity vitrification plant is operational;

8) Reserved

9) Disposition all secondary wastes; secondary wastes are identified on Figure C-1, *Privatization Functions, Inputs, and Outputs*, as those wastes associated with *Waste Disposal Services DOE Provides at No Cost*, and *Wastes the Contractor is Responsible for*;

10) Protect materials from diversion, and the facilities and materials from sabotage or other acts that can result in wide-spread exposure of workers and the public; and

11) When authorized, deactivate all Contractor facilities at the completion of waste treatment services.

d. DOE will provide the services identified in Figure C-1, *Privatization Functions, Inputs, and Outputs* to support Contractor operations, subject to the conditions and limitations contained in Section C.7, *Interface Descriptions*.

e. DOE will retain title to all material in the waste envelopes provided to the Contractor and in all intermediate and final waste products. DOE will not take title to nor responsibility for the *Wastes the Contractor is Responsible for*, as identified on Figure C-1, *Privatization Functions, Inputs, and Outputs.* The Contractor shall be responsible for all waste envelope materials provided by DOE, and for any material releases prior to product acceptance by DOE as provided for in H.31.c. Only DOE-provided wastes shall be treated in the Contractor's privatized facilities.

f. The Contractor shall provide system capacity for waste treatment services for minimum order quantities as established in Clause H.9, *Ordering and Contract Order Quantities*, within the period of delivery in Section F, *Deliveries or Performance*.

C.4.1 Part A

The Contractor shall provide the deliverables and services described in Table C4-1.1, *Part A Deliverables:*

Table C4-1.1, Part A Deliverables — CLIN 001 and CLIN 002*

Item No.	Description of Deliverable or Service	Standard/Reference	Action Required	Action Party	Point of Delivery
A-1	Integrated Master Plan	Standard 1	P	D	CO
A-2	Technical Report	Standard 2	P	D	CO
A-3	Products and Secondary Wastes Plan	Standard 3	P	D	CO
A-4	Safety, Health, and Environmental Program Deliverables	Section C.3 and Standards 4 and 8	P	D, R	CO, R
A-5	Safeguards and Security Program Plan	Standard 5	P	D	CO
A-6	Interface Control Documents	Section C.7	P	D	CO
A-7	Business and Finance Plan	Standard 6	P	D	CO
A-8	Fixed-Unit Prices	Standard 7	P	D	CO
A-9	Deactivation Plan	Standard 8	P	D	CO

Legend:
CO = Contracting Officer
D = DOE
P = Product Acceptance
R = Regulator (DOE as regulator or external regulator as appropriate)
* = If included in Contract

C.4.2 Part B-1

The Contractor shall provide the deliverables and services described in Section C.5, *Standards*. DOE shall review the deliverables in accordance with Clause H.37, *Part B-1*, and Table C4-2.1.

Clause H.37 and Section C.4.b describe the DOE and Contractor process related to determination of whether the deliverables meet Contract requirements.

Table C4-2.1 identifies the actions required by DOE and the Contractor following DOE receipt of deliverables, and independent of actions required under Clause H.37. DOE will provide comments within 30 days of receipt of the deliverable, unless otherwise specified within the Contract. Comments will be dispositioned by the IPT process within 30 days from receipt of DOE comments, unless otherwise specified within the Contract. At this point any unresolved issues will be dispositioned as provided for in the Action Category definitions in Table C4-2.1. The process applicable to interactions between the Contractor and the Regulatory Unit and the Regulatory deliverable approval cycle are referenced in Standard 4 of the Contract.

Table C4-2.1, Part B-1 Deliverables* — CLIN 003

*The Government may require additional submittals of these deliverables where such rights are provided "from time to time" or through other similar language elsewhere in this contract.

** At least 30 days prior to Financial Closing, BNFL shall provide to DOE ORP, for negotiation, final drafts of these designated (by ** in the "Contract Due Date" column below) Project Documents, Financing Documents, documentation evidencing the establishment of the Project Company, and other documentation necessary to enable Financial Closing. This distribution of final draft documents does not constitute a set of deliverables under this contract.

Item No.	Description of Deliverable or Service	Standard/ Reference	Action Required	DOE Action Party	Point of Delivery	Contract Due Date
B-1-1	Project Management Plan	Standard 1	C	D	CO	10/24/98
B-1-2	Integrated Master Plan	Standard 1	K	D	CO	11/24/98 and quarterly thereafter
B-1-3	Initial Cost Documentation Package	Standard 1	K	D	CO	12/24/98 and quarterly thereafter
B-1-4	Final Cost Documentation Package	Standard 1	K	D	CO	04/24/00
B-1-5	Monthly Status Reports	Standard 1	C	D	CO	09/30/98 and monthly thereafter
B-1-6(a)	Development Requirements Document	Standard 2	C	D	CO	11/24/98
B-1-6(b)	Planned B-2 Development Work Description	Standard 2	I	D	CO	05/24/00

Item No.	Description of Deliverable or Service	Standard/ Reference	Action Required	DOE Action Party	Point of Delivery	Contract Due Date
B-1-7	Process Verification Testing and Product Qualification Deliverables	Standard 2	C	D	CO	90 days after testing or 08/24/00
B-1-8(a)	Pilot Melter Basis of Design Document and Copies of Test Plans	Standard 2	I	D	CO	04/24/00
B-1-8(b)	Pilot Melter Progress Reports – included in Monthly Status Report	Standard 2	None	D	CO	N/A
B-1-9	Engineering and Design Standards Requirement Document	Standard 2	C	D	CO	11/28/98
B-1-10	Functional Specifications	Standard 2	C	D	CO	11/28/98
B-1-11	Basis of Design Document(s)	Standard 2	C	D	CO	11/28/98
B-1-12	Facility Expansion Capability Document	Standard 2	C	D	CO	04/24/00
B-1-13(a)	Facility Design and Operations Philosophy	Standard 2	C	D	CO	11/28/98
B-1-13(b)	Operational Research (OR) Model	Standard 2	C	D	CO	3/22/00 and When Updates Are Made by Contractor
B-1-14	Process Design Products	Standard 2	C	D	CO	04/24/00
B-1-15	Facility Design Products	Standard 2	C	D	CO	04/24/00
B-1-16	Site Drawings	Standard 2	K	D	CO	04/24/00
B-1-17	Facility Drawings	Standard 2	C	D	CO	04/24/00
B-1-18(a)	Construction Planning Deliverables	Standard 2	C	D	CO	N/A
B-1-18(b)	Engineering Execution Plan	Standard 2	C	D	CO	11/24/98
B-1-18(c)	Construction Strategy	Standard 2	C	D	CO	04/24/00
B-1-18(d)	Construction Mobilization Plans	Standard 2	C	D	CO	04/24/00
B-1-18(e)	Construction Information Packages	Standard 2	C	D	CO	04/24/00
B-1-18(f)	Facility Acceptance Strategy and other Related Data	Standard 2	C	D	CO	04/24/00
B-1-18(g)	Procurement Work Packages	Standard 2	C	D	CO	05/24/00
B-1-19	Early Construction Procurement Studies	Standard 2	K	D	CO	12/27/99
B-1-20	System Analysis and Optimization Studies	Standard 2	K	D	CO	12/24/98
B-1-21	Products and Secondary Wastes Plan	Standard 3	K	D	CO	04/24/00
B-1-22	Waste Form Compliance Plan (WCP) — Preliminary (HLW)	Standard 3	C	D	CO	04/24/99

Item No.	Description of Deliverable or Service	Standard/ Reference	Action Required	DOE Action Party	Point of Delivery	Contract Due Date
B-1-23	Waste Form Compliance Plan (WCP) Final HLW	Standard 3	K	D	CO	04/24/00
B-1-24	IHLW Qualification Documentation	Standard 3	C	D	CO	05/24/00
B-1-25	Waste Form Qualification Report (WQR) Outline (HLW)	Standard 3	C	D	CO	04/24/00
B-1-26	Waste Form Qualification Report (WQR) — Preliminary (HLW)	Standard 3	C	D	CO	05/24/00
B-1-27	ILAW Qualification Documentation	Standard 3	C	D	CO	05/24/00
B-1-28	Entrained Solids Qualification Documentation	Standard 3	C	D	CO	05/24/00
B-1-29	Reserved					
B-1-30	Quality Assurance Provisions Document - Draft	Standard 3	K	D	CO	04/24/00
B-1-31	Non-radiological Worker Safety and Health	Standard 4c.1	I/A	D/RU	CO/RU	04/24/00
B-1-32	Radiological, Nuclear and Process Safety	Standard 4c.2	I/A	D/RU	CO/RU	See Table S4-1
B-1-33	Design Safety Features Document	Standard 4	I/C	D/RU	CO/RU	02/24/99
B-1-34	Environmental Plan Revision	Standard 4	C	D	CO	04/24/00
B-1-35	Dangerous Waste Permit Application(s)	Standard 4	R	D	CO	04/24/00
B-1-36	Notice(s) of Construction	Standard 4	R	D	CO	04/24/00 or Function of C. A. date
B-1-37	Other Site Permits	Standard 4	R	D	CO	04/24/00
B-1-38	Prevention of Significant Deterioration (PSD) Analysis	Standard 4	C	D	CO	As required by CA or 03/24/00
B-1-39	Draft Risk Assessment Work Plan	Standard 4	C	D	CO	12/24/98
B-1-40	Final Risk Assessment Work Plan	Standard 4	C	D	CO	04/12/00
B-1-41(a)	Screening Level Risk Assessment –Letter Report	Standard 4	C	D	CO	5/24/00
B-1-41(b)	Screening Level Risk Assessment (SLRA) – Initial	Standard 4	C	D	CO	07/24/00
B-1-42	Draft Approach for IHLW Delisting	Standard 4	C	D	CO	11/24/99
B-1-43	Final Approach for IHLW Delisting	Standard 4	R	D	CO	04/24/00

Item No.	Description of Deliverable or Service	Standard/ Reference	Action Required	DOE Action Party	Point of Delivery	Contract Due Date
B-1-44	Draft Approach for ILAW LDR Compliance	Standard 4	C	D	CO	10/24/99
B-1-45	Final Approach for ILAW LDR Compliance	Standard 4	R	D	CO	03/24/00
B-1-46	Materials Control and Accountability Plan (Preliminary Draft)	Standard 5	K	D	CO	12/22/99
B-1-47	Security Plan (Preliminary Draft)	Standard 5	K	D	CO	12/22/99
B-1-48	Classified Attachment (Preliminary Draft)	Standard 5	K	D	CO	04/24/00
B-1-49	Financing Plan (Initial Draft)	Standard 6	C	D	CO	02/24/99
B-1-50(a)	Financing Plan (Final - April 2000 Draft)	Standard 6	N	D	CO	04/24/00
B-1-50(b)	Financing Plan (Final Draft)	Standard 6	N	D	CO	**
B-1-50(c)	Financing Plan (Final)	Standard 6	C	D	CO	08/24/00
B-1-51(a)	Business and Financing Schedule – Initial Draft	Standard 6	C	D	CO	11/24/98
B-1-51(b)	Business and Financing Schedule – Final Draft	Standard 6	C	D	CO	04/24/00
B-1-51(c)	Business and Financing Schedule – Final	Standard 6	C	D	CO	08/24/00
B-1-52(a)	Project Documents (including description of the EPC Arrangements) to Support Financing – Initial Draft	Standard 6	C	D	CO	01/10/00
B-1-52(b)	Project Documents (including description of the EPC Arrangements) to Support Financing – Updated Draft	Standard 6	C	D	CO	04/24/00
B-1-52(c)	Project Documents (including description of the EPC Arrangements) to Support Financing – Final Draft	Standard 6	C	D	CO	**
B-1-52(d)	Project Documents (including description of the EPC Arrangements) to Support Financing – Final	Standard 6	C	D	CO	08/24/00
B-1-53(a)	Project Company Documentation – Initial Draft	Standard 6	C	D	CO	05/24/99
B-1-53(b)	Project Company Documentation – Updated Draft	Standard 6	C	D	CO	04/24/00
B-1-53(c)	Project Company Documentation – Final Draft	Standard 6	C	D	CO	**
B-1-53(d)	Project Company Documentation – Final	Standard 6	C	D	CO	08/24/00

Item No.	Description of Deliverable or Service	Standard/ Reference	Action Required	DOE Action Party	Point of Delivery	Contract Due Date
B-1-54(a)	Financing Documents – Initial Draft	Standard 6	N	D	CO	08/24/99
B-1-54(b)	Financing Documents – Updated Draft	Standard 6	N	D	CO	04/24/00
B-1-54(c)	Financing Documents – Final Draft	Standard 6	N	D	CO	**
B-1-54(d)	Financing Documents – Final	Standard 6	C	D	CO	08/24/00
B-1-55(a)	Project Facility Financial Pro-Forma – Initial Draft	Standard 6	C	D	CO	02/24/99
B-1-55(b)	Project Facility Financial Pro-Forma – Final Draft	Standard 6	C	D	CO	04/24/00
B-1-55(c)	Project Facility Financial Pro-Forma – Final	Standard 6	C	D	CO	08/24/00
B-1-56	Evidence of Receipt of Permits and Governmental Approvals – Initial Draft	Standard 6	C	D	CO	08/24/00
B-1-57(a)	Equity Commitment Documentation – Initial Draft	Standard 6	N	D	CO	08/24/99
B-1-57(b)	Equity Commitment Documentation – Updated Draft	Standard 6	N	D	CO	04/24/00
B-1-57(c)	Equity Commitment Documentation – Final Draft	Standard 6	N	D	CO	**
B-1-57(d)	Equity Commitment Documentation – Final	Standard 6	C	D	CO	08/24/00
B-1-58(a)	Third Party Business Approvals and Authorizations – Initial Draft	Standard 6	C	D	CO	04/24/00
B-1-58(b)	Third Party Business Approvals and Authorizations – Final	Standard 6	C	D	CO	08/24/00
B-1-59(a)	Project Loan Commitment Evidence – Initial Draft	Standard 6	C	D	CO	04/24/00
B-1-59(b)	Project Loan Commitment Evidence – Final	Standard 6	C	D	CO	08/24/00
B-1-60(a)	Estimate of Termination Obligations – Initial Draft	Standard 6	N	D	CO	12/24/98
B-1-60(b)	Estimate of Termination Obligations – Quarterly Updates	Standard 6	N	D	CO	Quarterly 03/24/99 thru 03/24/00
B-1-60(c)	Estimate of Termination Obligations – Final Draft	Standard 6	N	D	CO	04/24/00
B-1-60(d)	Estimate of Termination Obligations - Final	Standard 6	N	D	CO	08/24/00

Item No.	Description of Deliverable or Service	Standard/ Reference	Action Required	DOE Action Party	Point of Delivery	Contract Due Date
B-1-61(a)	Risk Workshop Documentation – Initial Draft	Standard 6	C	D	CO	11/24/98
B-1-61(b)	Risk Workshop Documentation – Quarterly Updates	Standard 6	C	D	CO	Quarterly 02/24/99 thru 08/24/00
B-1-62	Other Project Documents Required by Lenders Not Already Identified	Standard 6	C	D	CO	08/24/00
B-1-63	Draft Waste Minimization Incentives	Standard 6	C	D	CO	10/24/99
B-1-64	Proposed Waste Minimization Incentives	Standard 6	N	D	CO	06/01/00
B-1-65	Firm Fixed Prices for Part B-2 and Supporting Documentation - Proposed	Standard 7	N	D	CO	04/24/00
B-1-66	Reserved					
B-1-67	Cost Accounting Standards Disclosure Statement	Standard 7	C	D	CO	04/24/00
B-1-68	Part B-2 Certified Cost or Pricing Data	Standard 7	C	D	CO	04/24/00
B-1-69	Deactivation Plan – Part A Revision	Standard 8	K	D	CO	04/24/00
B-1-70(a)	Interface Control Documents (ICDs) – Update	Section C.7	K	D	CO	02/24/99
B-1-70(b)	Interface Control Documents (ICDs) – Update	Section C.7	K	D	CO	08/24/99
B-1-70(c)	Interface Control Documents (ICDs) – Update	Section C.7	K	D	CO	03/24/00
B-1-70(d)	Interface Control Documents (ICDs) – Update	Section C.7	J	D	CO	08/24/00
B-1-71(a)	Cumulative Plant Performance Profiles for Pretreatment, HLW, LAW - Draft	Standard 2	C	D	CO	02/24/00
B-1-71(b)	Cumulative Plant Performance Profiles for Pretreatment, HLW, LAW - Final	Standard 2	N	D	CO	04/24/00
B-1-72(a)	Base Capacity Payment Pay-Performance Curves for HLW - Draft	Standard 2	C	D	CO	02/24/00
B-1-72(b)	Base Capacity Payment Pay-Performance Curves for LAW - Draft	Standard 2	C	D	CO	02/24/00
B-1-73(a)	Cumulative Project Contingency Utilization Profile - Draft	Standard 7	C	D	CO	02/24/00

Item No.	Description of Deliverable or Service	Standard/ Reference	Action Required	DOE Action Party	Point of Delivery	Contract Due Date
B-1-73(b)	Cumulative Project Contingency Utilization Profile - Final	Standard 7	N	D	CO	04/24/00
B-1-74	Financing Plan – Second Draft	Standard 6	C	D	CO	05/24/99
B-1-75	Letter of Assurance Regarding BNFL plc Equity Commitment	Standard 6	I	D	CO	01/21/00
B-1-76(a)	LAW conditioning facility design – Draft	Standard 2	C	D	CO	04/24/00
B-1-76(b)	LAW conditioning facility design - Final	Standard 2	C	D	CO	07/24/00
B-1-77	Environmental Report Letter Revision	Standard 4	C	D	CO	04/24/00
B-1-78	AP-101 Sample Analysis (Specification 7)	Standard 2	C	D	CO	06/24/00

Legend:
A = Approval of Regulatory Deliverables
C = Review and Comment
CO = Contracting Officer
D = DOE
I = Information
J = Jointly Developed
K = Concurrence
N = Negotiate
P = Product Acceptance
R = Review and Concur on Permits with external regulators
RU = Regulatory Unit (DOE as Regulator)

Legend Definitions:

As used throughout Section C, these items shall be defined as follows:

A Approval of Regulatory Deliverables — The interactions with the Regulatory Unit are described in Standard 4.

C Review and Comment — The deliverable shall be provided to DOE for review and comment. DOE will have the option for reviewing the information and providing comment through the IPT process. The Contractor is not required to respond formally to the comments. DOE comments that cannot be resolved in the appropriate IPT shall be elevated to the Project Management IPT for resolution. If consensus is not reached, the Contractor may proceed consistent with the Contractor's approach as reflected in its deliverables or DOE may direct a change under the Changes clause.

I Information — The deliverable shall be provided for information purposes only. DOE will have the option of reviewing the information and providing comments through the IPT process. Such comments do not require resolution under the Contract.

J Jointly Developed – The ICDs shall be jointly developed with DOE and the tank farm management contractor and provided to DOE for the DOE COR to issue as the operative ICDs.

K Concurrence — The deliverables shall be provided to DOE for review and concurrence. DOE shall review the deliverable and provide comments in writing. Comments will be discussed through the IPT process and the Contractor is required to provide written responses. The parties shall reach mutual agreement with respect to actions by DOE or the Contractor. If such agreement impacts Contractor's cost and/or schedule this impact will be reflected in the Part B-2 price and schedule.

N Negotiate — Contents of these deliverables shall be negotiated prior to proceeding with Part B-2.

P Product Acceptance — As defined in Section E.

R Review and Concur — Permits and Compliance Approvals with regulators external to DOE (i.e., other than the Regulatory Unit). The deliverables shall be provided to DOE for review, concurrence, and certification (when appropriate). DOE shall review the deliverable to determine that it is appropriate for its intended use. DOE comments will be provided in writing and discussed through the IPT process and the Contractor shall provide written responses. DOE comments that cannot be resolved in the appropriate IPT shall be elevated to the Project Management IPT for resolution. In the event that the deliverables meet the published requirements for the application or permit and other requirements of this Contract, but agreement between the Contractor and DOE cannot be reached, DOE may issue a directed change under the Changes clause or may terminate for convenience of the Government.

Neither the DOE review of the deliverables nor the decision of the DOE to proceed with Part B-2 work, shall impose any responsibility on the DOE for adequacy, quality or completeness of the deliverables. The Contractor remains solely responsible for the adequacy, quality and completeness of such work and the subsequent performance of the waste treatment services under this Contract.

C.4.3 Part B-2

The Contractor shall provide the deliverables and services described in Table C4-3.1, *Part B-2 Deliverables CLIN 004, 005, 006*, including all necessary revisions to previous deliverables. This table shall be updated prior to the end of Part B-1.

Table C4-3.1, Part B-2 Deliverables — CLIN 004, 005, 006

Item No.	Description of Deliverable or Service	Standard/Reference	Action Required	Action Party	Point of Delivery
B-2-1	Management Products and Control Deliverables	Standard 1	K	D	CO
B-2-2	Products and Secondary Wastes Plan and Deliverables	Standard 3	K	D	CO
B-2-3	Safety, Health, and Environmental Program Deliverables	Standard 4, C.1, C.2	I/A	D/RU	CO/RU
B-2-4	Safety, Health, and Environmental Program Deliverables	Standard 4, C.3	R	D	CO
B-2-5	Safeguards and Security Program Deliverables	Standard 5	K	D	CO
B-2-6	Low-Activity Waste Services	Specifications 2, 7, and Standard 3	P	D	H
B-2-7	High-Level Waste Services	Specifications 1, 8, 12, and Standard 3	P	D	H
B-2-8	Intermediate Waste Products	Specifications 3, 9, and Standard 3	P	D	H
B-2-9	Interface Control Documents	Section C.7	K	D	CO
B-2-10	Facility Deactivation	Standard 8	K	D	CO

Legend:
A = Approval of Regulatory Deliverables
C = Review and Comment
CO = Contracting Officer
D = DOE
H = Project Hanford Management contractor
I = Information
K = Concurrence on Interfaces
N = Negotiate
P = Product Acceptance
R = Review and Concur on Permits with external regulators
RU = Regulatory Unit (DOE as Regulator)

Definitions are same as in Table C4-2.1, *Part B-1 Deliverables—CLIN 003*.

C.5 Standards

This Section consists of the following Standards:

Standard 1: Management Products and Controls
Standard 2: Project Design Development
Standard 3: Product Qualification, Characterization, and Certification
Standard 4: Safety, Health, and Environmental Program
Standard 5: Safeguards and Security Program
Standard 6: Business and Finance Plan
Standard 7: Fixed-Unit Prices
Standard 8: Facility Deactivation

Standard 1: Management Products and Controls

This *Standard* describes the management products and controls required during Part B.

a. Project Management Plan (PMP): The PMP shall describe how the Contractor will manage the project. The PMP shall at a minimum include:

1) Summary of the Statement of Work;

2) Summary description of the technical, regulatory, and business and financial approach;

3) Work Breakdown Structure (WBS) and organizational structure;

4) Description of how the Contractor's organization will function;

5) Description of how the Contractor's work will be integrated with other Hanford Site work and how interfaces will be managed;

6) Description of cost and schedule control process and reporting;

7) Description of Contractor's risk management process; and

8) Statement of and/or reference to all requirements.

The PMP shall definitively demonstrate that the Contractor has in place the management processes and controls to manage and control the work and accomplish Part B. The Contractor's risk management plan shall be referenced in the PMP.

The PMP shall be delivered to DOE for review and comment 60 days after the Contractor is authorized to proceed with Part B.

b. Integrated Master Plan (IMP): The IMP shall include two sections. The first section is a narrative description of the basis for the cost and schedule baseline. The second section contains the cost and schedule baselines for Part B-1 and Part B-2. The IMP shall reflect the current planning case, and the schedule committed to by the Contractor (i.e., early/late start and finish dates).

The IMP shall describe work to be performed during Part B-1 and once DOE concurrence has been reached, the Part B-1 baseline schedule shall not be altered. Work to be accomplished during Part B-2 may be described in less detail and will emphasize Contractor interfaces. Major IMP updates will occur at key events, such as, start of construction, with a rolling increase in detail for activities less than one year out. There shall be sufficient information to demonstrate the logical sequence of activities to permit DOE to prepare a TWRS logic-driven, project life-cycle schedule and cost baseline. The IMP shall provide an annual spend plan.

In addition, the IMP shall at a minimum also contain:

1) Key Assumptions List: This list shall include assumptions made by the Contractor, especially those that indicate performance or milestones to be accomplished by the DOE or its Hanford Site contractors.

2) Critical Risk List: The Contractor's critical risk list shall be referenced in the IMP.

3) Top-Level Logic: The top-level logic shall show the relationships and interfaces the Contractor is responsible for in all parts of the TWRS program. The logic will specifically identify interdependencies and start-to-finish, finish-to-finish, etc. relationships. The linkage to major DOE/Hanford Site activities will be identified.

4) Lower Level Logic and Program Master Baseline Schedule with Key Milestones; and Resource Profile: Each activity box in the top-level logic shall be further broken down into one or more lower level logics. There shall be a one-to-many relationship between the top-level and the lower-level logics.

   The schedule shall be: 1) logic driven and shall show the duration of tasks, completion milestones, and critical path; 2) demonstrate how the Contractor will accomplish the work and meet the schedule; 3) contain levels of detail to promote understanding of the logical sequence of activities and to help identify all interfaces among performing organizations; and 4) be consistent with the information provided per Standard 1.c.2)(t).

5) DOE Activities and Decision Points: The Contractor shall identify and describe all DOE activities, including decision points and regulatory actions, that must be accomplished for the Contractor's plan to be successful. These activities, decision points, and regulatory actions shall be specifically included in either the top-level or lower-level logics.

The revised IMP shall be submitted to the DOE for review and concurrence 90 days after the Contractor is authorized to proceed with Part B-1, with the exception of the Part B-2 baseline schedule and estimate which shall be submitted not later than 120 days after Authorization to Proceed with Part B-1. The Contractor shall obtain concurrence on scope and schedule with all parties that have interfaces with the Master Baseline Schedule before the IMP schedules are issued. The Part B-1 schedule baseline will be fixed when concurrence has been reached. The Part B-2 schedule will continue to evolve during Part B-1. A trend monitoring process will be applied to the Part B-2 cost and schedule during Part B-1 and trend reports will be provided quarterly to DOE for information starting at 210 days from the start of Part B-1.

c. Project Cost Estimate and Supporting Documentation Package: The Contractor shall develop a Project Cost Estimate and Supporting Documentation Package, that shall support the prices given for Part B-1 and target prices for Part B-2, based on the information developed by the Contractor during Part B-1, using a bottoms-up estimating technique.

   1) The Project Cost Estimate and Supporting Documentation Package shall include:

(a) Facility estimate information based on quantity take-off on facility design information (including all available facility design drawings and specifications);

(b) Process and ancillary equipment estimate information based on process design information (including process flow sheet, process and instrument diagrams, and equipment lists);

(c) Project, construction management, and operational start-up estimate information based on projected staffing, qualification, and discipline mix requirements;

(d) Indirect rate information for each indirect rate applied within the cost estimate that identifies performer, elements of cost, and assumptions;

(e) Internal traceability between all cost estimate information and the project schedule and work breakdown structure;

(f) Contingency analysis and application of contingency to cost estimate; and

(g) Escalation analysis and application of escalation to cost estimate.

2) The Project Cost Estimate and Supporting Documentation Package shall be submitted as a written report that contains the following information:

(a) A description of the type and purpose of the estimate being performed including a summary description of facility design, process design, operational concept, and schedule.

(b) A description of the completeness of the facility and process design.

(c) A description of the methodology of how the estimate was developed.

(d) A description of the Work Breakdown Structure (WBS) and a description of the methodology for its development.

(e) A detailed technical description of the scope to be performed for each of the WBS elements. This shall include, as a minimum, performance specification(s) and the work activities required, but it shall also identify any work specifically excluded, any constraints or special conditions, ground rules, assumptions, and drivers.

(f) All estimating backup materials, including quantity takeoffs, equipment lists, detailed specifications, plans and drawings, calculations, databases used, historical data, cost estimating relationships, and actual quotes.

(g) Details of indirect cost including field distributable costs and a description of the work covered by indirect costs and how the indirect costs were estimated and developed. Field distributable costs shall be in enough detail to describe what is included. If, for example, a cost calculation per job

hour is used, a complete description of the scope covered by the calculation shall be included.

(h) An explanation and description of overhead and G&A rates as well as the elements included.

(i) A description and breakdown of how a standard base rate is burdened to arrive at the estimated hourly rate.

(j) The definitions and delineation for and categorization of costs into labor, material, equipment, travel, financial, fee, taxes, contingency, and other.

(k) The full delineation of any use of productivity or related factors, that clearly identifies when and where they are used and the basis for the utilization.

(l) A written analysis of how contingency/risk was determined. This includes all pertinent information necessary to understand and perform the calculations. Contingency shall be clearly discernable from all other costs. The probability distribution curve and the cumulative probability distribution curve which reflects the costs used to establish the proposed price shall be described.

(m) A traceability of the cost estimate to the proposed price. For each schedule developed by the Contractor, including but not limited to a schedule that reflects: (i) completion in accordance with Section F; or (ii) any completion date other than that set forth in Section F, the contractor shall provide a cost estimate that is traceable to the proposed price and is consistent with the Financial Pro Forma referenced in Section C, Standard 6, information provided in Standard 7, *Fixed-Unit Prices* and Section B, *Supplies or Services and Prices*. Such cost estimate also shall be linked to the detailed resource loaded critical path method ("CPM") schedule referenced in Section C, Standard 1. Any management adjustments with justification made prior to being input into the various models must also be included.

(n) A traceability from the cost estimate as developed under paragraph (m) above into the IMP which includes the detailed resource-loaded critical path method (CPM) schedule.

(o) Any estimate history, if the current estimate is a revision to an earlier estimate and a cross walk between submitted revisions.

(p) The basis of escalation, if applicable.

(q) The sub-tier contractor estimates detailing the same information as required by the Contractor and be traceable to the cost estimate and WBS.

(r) The names of the key preparers of the estimate.

(s) All information at the level for which it was derived.

(t) Per the requirements of Clause H.28, a detailed listing and description of assumptions with regard to application, review, issuance, or renewal and possible termination, suspension, or interruption by regulatory agencies, including the DOE Regulatory Unit, for any environmental, safety, or health permit, license, consent, or other authorization or approval essential to the design, construction, startup, operation, or deactivation of the facility(s). The listing and description of assumptions shall, at a minimum, address all deliverables, work products, and other documents required under Standard 4, *Safety, Health, and Environmental Program* and be in sufficient detail to document all underlying assumptions with regard to environmental, safety or health compliance that may materially impact cost or schedule. The listing and description of assumptions shall describe DOE, BNFL, and regulatory agency actions and responsibilities and shall be consistent with the schedule shown in the IMP.

3) The initial Project Cost Estimate and Supporting Documentation Package shall be submitted for review and concurrence 120 days after the Part B-1 Authorization to Proceed and shall support the prices given for Part B-1 and target prices for Part B-2. Updates of the Project Cost Estimate and Supporting Documentation Package shall be provided to DOE for information every three months thereafter including a summary of cost trends which will reflect the revised cost forecast. These updates shall reflect the most current information and logic and shall include the information set forth in paragraphs c.1) and c.2) of this Standard at the same or greater level of detail as provided to DOE in the initial Project Cost Estimate. Traceability between assumptions and documentation shall be maintained between the estimates for Part B-1 and Part B-2. Changes and traceability between the original submittal and the revisions to the original submittal and between revisions shall be clearly documented.

The final Project Cost Estimate and Supporting Documentation Package shall be provided to DOE for review and concurrence no later than 20 months after Authorization-to-Proceed with Part B-1, unless formally specified in writing by DOE. Changes and traceability between the original submittal, revisions to the original submittal, and final cost documentation package shall be explained and documented.

d. Status Reports: The Contractor shall develop a reporting system that reports project performance on the technical work, schedule, and cost profile defined in the IMP, and at the level agreed to by DOE and the Contractor.

Status reports shall be prepared monthly and commence at the end of the first month of Part B. Reports shall be submitted to DOE for review and comment by the last working day of the following month. The reports for the first two months prior to the submittal of the IMP shall include the narrative and performance curves of the cost and job hour status as planned, actual, and forecast percents complete. The percent variances shall be identified and addressed. In addition, the status report shall also include a written report and briefing that addresses:

1) Project manager narrative assessment;

2) Significant accomplishments and progress towards completion of project goals and objectives;

3) Comparison of the amount of work completed against the project baseline;

4) Potential problems, impacts, and alternative courses of action;

5) Performance, using a schedule-based method to identify potential schedule deviations and needed corrective actions before they impact the baseline;

6) Critical-path analysis to monitor the completion of important activities in the correct sequence;

7) Critical risks, actions planned, and actions taken to address those risks;

8) Status of decisions, including DOE decisions, and information requirements for those decisions;

9) 90-day forecast for major activities and milestones; and

10) Changes report summary for those changes that impact DOE or site interfaces or major project milestones.

11) Project contingency utilization (reporting commences with the start of Part B-2 of the Contract)

Performance reporting shall address the cost and job hours as planned, actual, and forecast percents complete. Reports shall include data for the total project cost and performance for the major WBS elements.

e. The Contractor shall apply change control and trend reporting through formal procedures to the baseline Part B-1 and Part B-2 cost estimates and schedules. Change control procedures will also be applied to the design process. The procedures shall identify at least two categories of change or trend, i.e., those that impact interfaces with DOE and the Site or major milestones and those that have no such impact. Changes that impact such interfaces and/or milestones shall be reported to DOE for concurrence. Change control and trend monitoring shall be implemented concurrent with the issue to DOE of the baseline cost estimate and schedule.

f. Tri-Party Agreement Notification: The Contractor shall make its best effort to provide written notice to the Contracting Officer at least seven months in advance of a TPA requirement due date that applies to the work under the Contract that will not or may not be met. Such notice will be separate from any other reporting requirement under this Contract.

g. The Department of Energy Office of River Protection (ORP) has formed a Project Integration Office (PIO) to integrate and help manage the River Protection Project Activities. The office will integrate activities of Hanford Contractors, BNFL, Inc (BNFL), Pacific Northwest National Laboratory (PNNL) and ORP tasks associated with the safe storage, retrieval, immobilization and disposal of radioactive tank waste. BNFL shall support the PIO activities by providing up to 4 full time equivalent staff in:

1) Requirements Management;

2) RPP Life-Cycle Modeling, a simulation tool that will provide the Office of River Protection with the capability to make informed strategic decisions based on the life-cycle cost, schedule, and threats to worker and public health and the environment;

3) An Integrated Flowsheet that will serve to integrate assumptions and communicate expectations for all interface streams between BNFL and the rest of the site;

4) Interface Management support to develop interface control and monitoring for all external interfaces;

5) An Integrated Baseline (technical and schedule) which provides a comprehensive link between BNFL's Integrated Master Plan and the Hanford Contractor's Multi-Year Work Plan.

Standard 2: Project Design Development

The purpose of this *Standard* is to describe the: 1) technical information requirements and objective evidence required during Part A, and 2) specific Contractor-developed deliverables to be submitted to DOE for action during Part B-1. The requirements of Standard 2 shall not supersede, conflict with, or reduce the requirements of Standard 4, *Safety, Health, and Environmental Program*.

Part A: Technical Report

The Technical Report shall include the following minimum topical contents:

a. For each waste envelope included under this Contract, a process flowsheet that includes:

   1) Mass balance;

   2) Preliminary equipment selection;

   3) Projected equipment performance;

   4) Range and expected value for the composition and volume of all product and secondary waste interfaces shown on Figure C-1, *Privatization Functions, Inputs, and Outputs;* and

   5) Range and expected value of waste loading in the final waste products.

   Expected values established in the process flowsheet will be used to establish the *Reference Values* for controlled elements in Clause H.6, *Price Adjustment for Waste Minimization*.

b. General facility arrangement drawings.

c. Process design basis, facility design basis, and operational concept for the waste treatment services, including:

   1) Plant and major equipment life;

   2) Plant capacity, operating efficiency, reliability, availability, maintainability, and inspectability;

   3) Operational campaigns for each waste envelope included in this Contract and facility or process modifications required for each campaign;

   4) Approach to minimize impact of waste envelope constituents that limit performance of waste treatment services; and

   5) If HLW services are included in the Contract, capability to handle an alternative HLW canister size.

d. Specific solutions to technical, operational, and related performance risks that were identified: 1) at the time of proposal; and 2) during Part A.

e. For each waste envelope included under this Contract, the disposal strategy for the *Waste the Contractor is Responsible for*, identified in Figure C-1, *Privatization Functions, Inputs, and Outputs.*

f. Detailed description of technical or operational performance improvements, the changes in the Contract required to implement the change, and the benefits if implemented. Improvement categories include, but are not limited to:

1) Materials the Contractor proposes to remove from the waste envelopes for reuse;

2) Alternative sequence to process waste envelopes;

3) Alternative site locations within the Hanford Site 200 Area;

4) Capability for increased waste treatment system capacity and duration of service;

5) Capability to provide non-RCRA regulated intermediate and final waste products;

6) Capability to increase waste oxide loading in the final waste products to a maximum achievable value;

7) Capability to reduce final waste product quantities, and volume through more aggressive separations; and

8) If HLW services are included in the Contract, the capability to receive expanded compositional range of selected constituents in the waste envelopes.

9) If HLW services are included in the Contract, the capability to treat and immobilize the HLW feed and the Entrained Solids removed from the LAW feed envelopes in the final waste products described in Specification 1, *Immobilized High-Level Waste* (no intermediate waste products would be returned to DOE under this case).

g. Plan for scale-up testing, including radioactive and non-radioactive process testing to be conducted during start of production operations. Testing shall evaluate the variability expected during normal and bounding operations.

h. Design features that facilitate deactivation, subsequent decontamination, decommissioning, and RCRA closure.

i. Design features that provide an integrated system of safeguards and security to prevent, detect, and respond to unauthorized possession, use, or environmental sabotage.

The objective evidence presented in the Technical Report shall include:

a. Technical performance basis document that demonstrates:

1) That the full range of waste envelopes can be treated;

2) Intermediate and final waste product requirements can be met; and

3) Separations processes are capable of separating the Hanford tank waste feed stream into a separate low-activity and high-level fraction.

b. Test results that demonstrate the performance of:

1) Separations processes for Entrained Solids, ^{137}Cesium, ^{99}Technetium, and ^{90}Strontium and Transuranics;

2) Conversion of ^{137}Cesium to an intermediate waste product; and

3) Final waste products.

Intermediate and final waste product performance shall comply with the testing and analysis requirements defined in Table S3-1, *Product Qualification, Characterization, and Certification Documentation* (*see* Standard 3, *Product Qualification, Characterization, and Certification*). Simulant validity shall be demonstrated if simulants are used.

The test results for Waste Envelopes A, B, and C shall identify the quantity and distribution of all materials that are present in amounts greater than 1 mg/liter or 1.0E-6 curies(Ci)/liter.

If HLW services are included in the Contract, the test results for Waste Envelope D shall identify the quantity and distribution of all materials that are present in amounts greater than 1.0E-2 weight percent or 2.0E-5 Ci/gram.

c. Results of testing conducted on final products using simulants or waste envelope samples including the following, which must use waste envelope samples:

1) Testing with waste envelope samples is required for product waste loading, product composition, and product performance;

2) For the Immobilized Low-Activity Waste (ILAW) product, Specification 2, *Immobilized Low-Activity Waste* requirements established in Sections 2.2.2.6, 2.2.2.7, 2.2.2.8, 2.2.2.17.1, 2.2.2.17.2, 2.2.2.20, and 2.2.2.21 shall be performed with waste envelope samples; and

3) For the Immobilized High-Level Waste Product, Specification 1, *Immobilized High-Level Waste* requirements established for the Product Consistency Test and compositional requirements in the WASRD shall be performed with waste envelope samples.
DOE will make available to the Contractor ten 125 ml samples of Waste Envelopes A, B, and C; two 50 gram dried samples of Waste Envelope D; and an additional 1.0 liter sample of Waste Envelope C. Samples will be sent to a location of the Contractor's choice. Liquid samples will be sent in a DOT 7A Type A Hedgehog package; dried samples will be sent in a Nu Pac PAS-1 cask (shielded cask certified by the Nuclear Regulatory Commission (USA/9184/B(U)). Sample characteristics may not be identical to waste delivered in Part B; actual tank waste characteristics will vary within waste envelopes. DOE will provide the Contractor the results of

sample analysis and the methodology used to prepare samples. The Contractor is responsible for reconciling any changes to sample characteristics which may have occurred subsequent to sample preparation. DOE and the Contractor will jointly work to address problems resulting from changes in sample characteristics subsequent to sample preparation.

Part B-1:

During Part A, the Contractor provided DOE with proposed work activities associated with the Contractor's path forward to achieve confidence in the process and facility design. During Part B-1, the Contractor shall:

- Optimize the waste treatment system developed in Part A;
- Provide a technical basis to establish the waste treatment system performance, mitigate risk, and reduce contingencies in the waste treatment services;
- Revise the technical, operational, regulatory, and financial elements of the waste treatment system required to provide waste treatment services at fixed-unit prices;
- Perform all Contractor activities necessary to reach financial closure as defined in Standard 6, *Business and Finance Plan*; and
- Develop and submit for DOE action, the deliverables defined in Table C4-2.1, *Part B-1 Deliverables - CLIN 003*.

All deliverables identified in Table C4-2.1, *Part B-1 Deliverables - CLIN 003*, shall be:

- Identified in the IMP and statused in accordance with the requirements of Standard 1, *Management Products and Controls*;
- Developed and submitted by the Contractor as the deliverables are generated, for DOE action, and no later than 20 months after the Authorization to Proceed with Part B-1; and
- Prepared to provide traceability and integration across all technical, operational, regulatory, and financial elements.

a. Process Verification Testing and Product Qualification Deliverables: Process verification test results shall provide the basis for establishment of the refined process flow sheets and material balances associated with the treatment of LAW and HLW. The Contractor shall provide engineering analyses that demonstrate the application of the process verification test results to the full-scale process design, to DOE for review and comment. All process verification and product qualification tasks shall be conducted in accordance with an approved quality assurance program. Immobilized High-Level Waste (IHLW) qualification work shall be conducted in accordance with a quality assurance program that complies with the requirements of the *Quality Assurance Requirements and Description for the Civilian Radioactive Waste Management Program (QARD)*, DOE/RW-0333P. All process verification testing and product qualification activities shall be performed consistent with the BNFL Development Requirements Document. Process verification testing and product

qualification deliverables to be produced during Part B-1 of the Contract shall address the following areas:

1) Process Verification and Testing Planning and Reporting

(a) The Contractor shall deliver to DOE a revision to the integrated Development Requirements Document prepared in Part A, within 90 days of the Part B-1 Authorization to Proceed. The revised Development Requirements Document shall identify tasks planned to be conducted during Part B-1 and Part B-2.

(b) The Contractor shall provide DOE copies of the Contractor-approved test plans for all process verification testing and product qualification testing in advance of conducting the test.

(c) The Contractor shall issue to DOE completed test reports for process verification testing and product qualification 90 days after testing is complete or the end of Part B-1, whichever is sooner.

(d) The Contractor shall issue to DOE for information a description of the planned B-2 development work. This shall include the basis, schedule and need for the development work, whether the work is active or inactive and the scale the work is to be conducted at.

2) Characterization of LAW and HLW Feeds: The Contractor shall further characterize the tank waste samples provided by DOE to provide the basis for the Dangerous Waste Permit Application (DWPA), process verification, and product qualification testing. The analysis requirements for the as-received and treated tank waste samples shall be defined by the Contractor in the Contractor's test plan. Characterization information for the samples shall include: viscosity, density, particle size distribution (if sufficient solids are present in samples), chemical composition, radiochemical composition, hazardous materials composition consistent with the analysis requirements of the DWPA, and solids solubility versus concentration (if sufficient solids are present in samples). The Contractor shall also determine if the sample materials meet Specification 7, *Low-Activity Waste Envelopes Definition*, limits for LAW samples and Specification 8, *High-Level Waste Envelope Definition*, limits for HLW samples.

The Contractor shall analyze, test, and assess the capability of the proposed waste treatment processes to meet the requirements for producing an IHLW form that can meet HWMA and RCRA de-listing technical requirements in accordance with Specification 1, *Immobilized High-Level Waste* and for producing a Land Disposal Restrictions (LDR)-compliant ILAW form in accordance with Specification 2, *Immobilized Low-Activity Waste*.

The Contractor shall implement the Regulatory Data Quality Objectives (DQO) entitled "Regulatory Data Quality Objectives Supporting Tank Waste Remediation System Privatization Project", KD Wiemers, et al, dated December 1998. No. PNNL-12040, Rev 0.

During Part B-1, the Contractor shall optimize the DQO through negotiations with DOE and develop the test specifications and plans to implement the revised DQO. As available, data and data needs identified during the treatment facility permitting process, the Risk Assessment Work Plan and LDR/Delisting efforts will be used as inputs to the optimization process. After revisions to the DQO and the test plans have been agreed to, BNFL shall provide a cost and schedule proposal for implementing the DQO (Step 1 and 2) in Part B-2. This proposal shall be included in the BNFL firm fixed price for performing Part B-2 and should include scope for further optimizing the DQO after completion of Step 1. The proposal shall include the cost for characterizing all Phase 1 candidate feeds tanks. The Contractor shall request samples for this scope through ICD No. 23 "Waste Treatability Samples" in order to carry out these studies. ICD 23 shall be finalized by April 15, 2000.

In Part B-2, characterization of LAW and HLW feeds shall be performed to appropriate quality assurance standards defined in the DQO and the results provided to DOE in accordance *with Standard Electronic Format Specification for Tank Characterization Data Loader: Version 2.4.* HNF-3638, Revision 0, Lockheed Martin Company, Richland, Washington. The Contractor shall provide test specifications, test plans and interim reports to DOE at appropriate intermediate steps and final reports in accordance with the requirements of Standard 2, Part B-1, subparagraph a.1 and a.2.

a. The Contractor shall analyze a composite sample of tank 241-AP-101 to determine the concentration of analytes in the supernatant identified in the Low-Activity Waste and High-Level Waste Processing Data Quality Objectives (Patello, et al, PNNL-1216 rev. 0, 1999). Analysis of solids per the DQO shall be performed if greater than 0.5 wt% insoluble solids are present. The sample analysis is to be conducted in accordance with the quality assurance requirements of the Hanford Analytical Services Quality Assurance Requirements Documents (DOE/RL-96-89). Analytic results are to be reported using the Standard Electronic Format Specification for Tank Waste Characterization Data Loader: Version 3.0 (HNF-3638, revision 1). The Contractor shall also conduct testing with a composite sample of tank 241-AP-101 to quantify as wt% solids the extent of crystallization and/or precipitation that occurs at a temperature of 10°C.

3) Radioactive Laboratory-Scale Testing

(a) Radioactive Validation of Waste Separations Processes: The Contractor shall conduct laboratory-scale studies using waste samples provided by DOE, to further demonstrate the capability of the LAW pretreatment processes selected by the Contractor in Part A for removal of entrained solids, Cs-137, Tc-99, Sr-90, and TRU elements. The Contractor shall demonstrate all normal operations required during waste processing operations.

(b) Radioactive Validation of Sludge-Washing Processes: The Contractor shall conduct laboratory-scale studies using waste sludge samples provided by DOE, to demonstrate the specific procedure for implementing Specification 12, *Number of HLW Canisters per Batch of Waste Envelope D.* The Contractor shall validate the proposed process for treating HLW slurry including the proposed solid-liquid separation process to separate the HLW sludges from the supernate and support washing of the sludges. The Contractor shall conduct tests to demonstrate operational parameters as proposed in the plant-scale operations including chemistry, temperature, washing kinetics, and separations approaches. Based upon the experimental data, the Contractor shall propose changes to optimize Specification 12, *Number of HLW Canisters per Batch of Waste Envelope D.* In Part B-1, samples as small as 25 grams (or smaller if an insufficient amount of material is provided by DOE for this size test) of solids may be used in conducting tests in accordance with Specification 12, *Number of HLW Canisters per Batch of Waste Envelope D.*

(c) Immobilized Low-Activity Waste Qualification: Radioactive Testing

i. The Contractor shall prepare laboratory-scale (i.e., gram-quantity crucible melt) samples of immobilized LAW glasses from the waste samples provided by DOE. The waste samples shall have been pretreated in accordance with the Contractor's planned LAW feed pretreatment processes.

ii. The Contractor shall operate a laboratory-scale (e.g., nominally 10 kg/day) melter system and produce samples of Immobilized Low-Activity Waste (ILAW) glasses from a waste sample provided by the DOE. The waste sample shall have been pretreated in accordance with the Contractor's planned LAW feed pretreatment processes.

iii. The ILAW glasses prepared from actual pretreated wastes shall be analyzed to demonstrate the Contractor's ability to comply with the chemical and radionuclide reporting requirements in ILAW Specifications 2.2.2.6 *Chemical Composition Documentation*, 2.2.2.7 *Radiological Composition Documentation*, and 2.2.2.8 *Radionuclide Concentration Limitations*.

iv. The Contractor shall use glasses prepared from actual pretreated wastes to demonstrate waste loading in compliance with ILAW Specification 2.2.2.2 *Waste Loading*.

v. The Contractor shall use glasses prepared from actual pretreated wastes to conduct tests to confirm that excluded organic materials are not present in the IHLW glass.

vi. The Contractor shall use glasses prepared from actual pretreated wastes to conduct the Product Consistency Test with the ILAW glass samples in accordance with ILAW Specification 2.2.2.17 *Waste Form Leach Testing.*

vii. The Contractor shall use glasses prepared from actual pretreated wastes to conduct testing to comply with ILAW Specification 2.2.2.21, *Dangerous Waste Limitations*.

viii. The Contractor shall compare the results of the ILAW qualification testing with ILAW glasses prepared from actual wastes with similar tests conducted with non-radioactive ILAW glasses prepared from simulated wastes to validate the results of the non-radioactive ILAW qualification program.

(d) Immobilized High-Level Waste Qualification: Radioactive Testing

i. The Contractor shall prepare laboratory-scale (i.e., gram-quantity crucible melt) samples of immobilized high-level waste glasses from the waste samples provided by the DOE. The waste samples shall have been pretreated in accordance with the Contractor's planned HLW feed pretreatment processes.

ii. The IHLW glasses prepared from actual pretreated wastes shall be analyzed to demonstrate the Contractor's ability to comply with the chemical and radionuclide reporting requirements in the Waste Acceptance Product Specifications for Vitrified High-Level Waste Forms (WAPS), DOE/EM-0093, Specifications 1.1 *Chemical Specification*, 1.2 *Radionuclide Inventory Specification*, 1.6 *IAEA Safeguards Reporting for HLW Specification*, and 3.14 *Concentration of Plutonium in Each Canister Specification*, for IHLW.

iii. The Contractor shall use glasses prepared from actual pretreated wastes to demonstrate product loading in compliance with IHLW Specification 1.2.2.1.6, *Product Loading*.

iv. The Contractor shall use glasses prepared from actual pretreated wastes to identify and quantify crystalline and non-crystalline phases in the glass samples in accordance with WAPS Specification 1.1.1, *Chemical Composition Projections* for IHLW.

v. The Contractor shall use glasses prepared from actual pretreated wastes to conduct tests to confirm that excluded materials including free liquids, explosive, pyrophoric, combustible, and organic materials are not present in the IHLW glass.

vi. The Contractor shall use glasses prepared from actual pretreated wastes to conduct the Product Consistency Test on the IHLW glass samples in accordance with WAPS Specification 1.3, *Specification for Product Consistency* for IHLW.

vii. The Contractor shall use glasses prepared from actual pretreated wastes to conduct testing to comply with IHLW

Specification 1.2.2.1.5, *Dangerous and Hazardous Waste Requirements.*

viii. The Contractor shall compare the results of the IHLW qualification testing with IHLW glasses prepared from actual wastes with similar tests conducted with non-radioactive IHLW glasses prepared from simulants to validate the results of the non-radioactive IHLW qualification program.

(e) Sulfur Removal Tests from LAW Feed Materials: The Contractor shall conduct testing to demonstrate methods to mitigate the impact to the ILAW glass volume from sulfur compounds present in the LAW feed envelopes. The testing information shall support equipment scale-up and design, and process flow sheet and material balance development. The Contractor may choose to complete non-radioactive tests using qualified waste simulants to provide additional data to support the equipment scale-up and design, and process flow sheet and material balance development. Following the completion of these tests, the Contractor shall issue a report to DOE based on the results of these tests and analyses, that includes revised estimates for ILAW glass volumes and material balance information.

4) Non-Radioactive Laboratory-Scale Testing

(a) ILAW Glass Optimization: Optimization of the ILAW glass formulation shall be conducted using simulants of Envelopes A, B, and C. Crucible melts and small-scale melters shall be used. ILAW glass formulations shall be prepared and tested to further define an operating envelope for the ILAW waste treatment facility. Optimization shall include, at a minimum, waste loading, product durability, and processing parameters. The Contractor shall include DOE participation in optimization of the glass, in support of disposal system analysis. This activity will also develop the basis for defining the number of units of Envelope B and C feed, per metric ton of waste sodium, in accordance with Specification 7.2.3, *Units of Low-Activity Waste.*

(b) IHLW Glass Optimization: Optimization of the IHLW glass formulation shall be conducted using simulants of Envelope D. Crucible melts and small-scale melters shall be used. IHLW glass formulations shall be prepared and tested to further define an operating envelope for the IHLW waste treatment facility. Optimization shall include, at a minimum, waste loading, product durability, and processing parameters.

(c) Immobilized Low-Activity Waste Qualification: Non-Radioactive Testing

i. Laboratory-scale samples of immobilized low-activity waste glasses shall be prepared from non-radioactive simulants based on LAW Envelopes A, B, and C. The glass samples shall be prepared on a laboratory scale (i.e., gram-quantity crucible melt) and in pilot-scale (10 to 3,300 kg/day) ILAW glass melters.

ii. The ILAW glasses prepared shall be analyzed to demonstrate the Contractor's ability to comply with the chemical reporting requirements in ILAW Specifications 2.2.2.6, *Chemical Composition Documentation*.

iii. The Contractor shall demonstrate waste loading in compliance with ILAW Specification 2.2.2.2, *Waste Loading*.

iv. The Contractor shall identify and quantify crystalline and non-crystalline phases in the glass samples in accordance with ILAW Specification 2.2.2.6, *Chemical Composition Documentation*.

v. The Contractor shall conduct the Product Consistency Tests with non-radioactive ILAW glass samples in accordance with ILAW Specification 2.2.2.17, *Waste Form Leach Testing.*

vi. The Contractor shall conduct testing in accordance with ILAW Specification 2.2.2.21, *Dangerous Waste Limitations.*

vii. The Contractor shall compare the results of the immobilized low-activity waste qualification testing with non-radioactive ILAW glasses prepared from simulated wastes with similar tests conducted with ILAW glasses prepared from actual wastes to validate the results of the non-radioactive ILAW qualification program.

viii. The Contractor shall provide samples, testing data and compositional analysis, to DOE for performance assessment analyses.

(d) Immobilized High-Level Waste Qualification: Non-Radioactive Testing

i. Laboratory-scale samples of IHLW glasses shall be prepared from non-radioactive simulants based on HLW Envelope D. The glass samples shall be prepared on a laboratory scale (i.e., gram quantity crucible melt) and in pilot-scale (e.g., 10 to 1,000 kg/day) IHLW glass melters.

ii. The IHLW glasses shall be analyzed to demonstrate the Contractor's ability to comply with the chemical reporting requirements in WAPS Specifications 1.1, *Chemical Specification* for IHLW.

iii. The Contractor shall demonstrate product loading in compliance with IHLW Specification 1.2.2.1.6, *Product Loading.*

iv. The Contractor shall identify and quantify crystalline and non-crystalline phases in the glass samples in accordance with WAPS Specification 1.1.1, *Chemical Composition Projections* for IHLW.

v. The Contractor shall conduct tests to confirm that excluded materials including free liquids, explosive, pyrophoric, combustible, and organic materials are not present in the IHLW glass.

vi. The Contractor shall conduct the Product Consistency Test on the IHLW glass samples in accordance with WAPS Specification 1.3, *Specification for Product Consistency* for IHLW.

vii. The Contractor shall conduct testing to comply with IHLW Specification 1.2.2.1.5, *Dangerous and Hazardous Waste Requirements.*

viii. The Contractor shall compare the results of the IHLW qualification testing with IHLW glasses prepared from actual wastes with similar tests conducted with non-radioactive IHLW glasses prepared from simulants to validate the results of the non-radioactive IHLW qualification program.

5) Non-Radioactive Pilot-Scale Testing

(a) Solids-Liquid Separation Testing

i. The Contractor shall conduct testing of the planned prototypical solid-liquid separation process to verify full-scale equipment sizing and operational requirements for:

- HLW sludge/supernatant separations,
- HLW sludge washing,
- Entrained Solids removal from LAW feeds, and
- Separations of Sr/TRU precipitate.

ii. The Contractor shall develop qualified representative simulants for the tests based upon waste characterization information and requirements important to the understanding of equipment performance.

iii. The Contractor shall establish operating conditions and performance for the equipment systems and solids separations efficiencies.

iv. The Contractor shall provide engineering analyses that apply the test data to plant design and scale up.

(b) Ion Exchange System Testing

i. The Contractor shall conduct testing of the proposed ion-exchange systems using a scalable ion-exchange column to confirm loading efficiency, elution efficiency, and regeneration efficiency using the proposed solution flow directions to be used in the plant.

ii. Swelling and contraction of the ion-exchange materials during loading, elution and regeneration phases of operation shall be determined.

iii. Hydraulic emplacement and removal of the ion-exchange materials shall be demonstrated using a process test system that represents the plant system hydraulics.

iv. The Contractor shall conduct tests of the ion-exchange materials to establish the chemical and radiochemical stability in the conditions envisioned in the operating plant. Based upon testing, ion-exchange material properties, and expected plant conditions, the operational lifetime of candidate ion-exchange materials shall be estimated.

v. The Contractor shall provide engineering analyses that apply the test data to plant design and scale-up.

(c) LAW and HLW Vitrification Feed Preparation - Non-Radioactive Pilot-Scale Testing

i. The Contractor shall conduct small-scale characterization testing of the glass formers and develop information for design of the full-scale system.

ii. The Contractor shall develop information for design of the full-scale system. This shall include hot and cold rheology measurements of the glass former/feed mixtures.

(d) LAW Vitrification Melter - Non-Radioactive Pilot Melter

The Contractor is undertaking development of a joule-heated melter outside the scope of this Contract. Although being developed as part of an independent vitrification technology research and development program, its primary objective is to provide data to the Contract.

i. The primary objectives of the pilot melter address the need to satisfy TWRS LAW melter throughput and performance issues early in plant design. The objectives are as follows:

- To demonstrate that the proposed LAW melter configuration is capable of achieving and sustaining a glass production rate of at least 1 MT/m^2 - day for a $10m^2$ melter under representative operating conditions.

- To provide empirical data to determine the life expectancy of the LAW melter and melter components under representative operating conditions.

- To validate the performance of the proposed LAW melter configuration (or determine a better configuration).

- To define the LAW melter operational parameters and control requirements.

ii. Secondary objectives for the pilot melter are as follows:

- Demonstrate the performance of the proposed HLW melter discharge system.

- To generate performance data for key off-gas components to support preliminary off-gas design.

The Contractor shall provide data to the DOE consistent with these objectives to support the Contractor's design scope.

The Contractor shall also make best endeavors to ensure that the independent melter research and development program schedule is sustained consistent with the design data needs identified in the Contractor's Part B-1 schedule.

The Contractor shall provide to DOE, for information purposes only, a copy of the pilot melter basis of design document and copies of the test plans aimed at meeting the development program primary objectives.

The Contractor shall also provide DOE progress reports against the pilot melter program as part of its Contractor's monthly program reporting required under Standard 1.d., *Status Reports.*

(e) LAW and HLW Vitrification System - Non-Radioactive Laboratory-Scale System: The Contractor shall conduct tests with a third scale melter with HLW feeds to demonstrate the HLW melter design can achieve 0.4 MT/m^2-day throughput.

The contractor shall operate intermediate scale LAW melters to maximize SO_3 loading without the formation of separated molten sulfate salt phases and provide information related to feed and cold-cap behavior and foaming.

The contractor shall conduct tests of laboratory-scale melter systems to demonstrate off-gas challenge and provide basic design parameters to support the Process design and show the waste treatment plant will meet the requirements for gaseous effluents from the LAW and HLW vitrification processes. The Contractor shall demonstrate the ability to meet anticipated and known off-gas treatment requirements for the Contractor's facility and the Hanford Site.

The primary off-gas system and some elements of the secondary off-gas system shall be tested at a larger scale to show that the waste treatment plant will meet the requirements for cleaning the gaseous effluents from the HLW vitrification process (additionally some of the other key components shall be tested on a large scale on the LAW pilot melter). The tests will be designed to give assurance that the proposed design will be able to meet anticipated and known off-gas treatment requirements for the Contractor's facility on the Hanford site. Specific requirements of the Part B-1 LAW and HLW Vitrification Lab-scale melter off-gas testing includes:

i. Conduct test of a laboratory-scale HLW and LAW melter with a minimum of six melter turnovers to demonstrate the gaseous effluent challenge from the melter to the off-gas system.

ii. Determine off-gas composition from lab scale melters for the LAW and HLW feeds and determine melter system removal efficiencies for a group of target hazardous organic compounds.
The tests are to be conducted according to SW-846 methods by independent Washington State certified analytic laboratories.

iii. Determine the efficiency of the primary off-gas and some key secondary off-gas components for reducing the emission of NO_x, SO_x, Cs, I, Cl and F for HLW feed.

iv. Determine build-up of S, Cl, F and P in the melter and off-gas system using a simulated HLW feed at the maximum concentration values in the HLW feed specification. The tests shall be conducted for a minimum of 24 hours with and without the operation of glass melter bubblers.

v. Determine the gaseous and aerosol emissions from the LAW Pilot Melter of NO_x, SO_x, Halides and other species challenging the offgas system.

vi. Determine the particle size distribution and quantities of aerosol emissions from the LAW Pilot Melter.

vii. Determine sulfur and chloride emissions from the LAW Pilot Melter to assess the recycle impact of sulfur and chloride in the offgas system.

viii. Determine the efficiency of key LAW Pilot Melter offgas components for reducing the emissions of NO_x, SO_x, Halides and other species.

(f) IHLW Package Qualification

i. The Contractor shall prepare during the Part B-2 Contract period full-scale prototype IHLW canister waste forms composed of simulated IHLW glass within the proposed 4.5 meter tall, austenitic stainless steel canister.

ii. After filling the canister with simulated IHLW glass and canister closure, the Contractor shall test the IHLW canister to demonstrate compliance with WAPS, 2.4 *Specification for Canister Length and Diameter* and 3.11 *Specification for Weight and Overall Dimensions*, as modified by IHLW Specification 1.2.2.1.3.

iii. Drop tests shall be conducted to demonstrate compliance with WAPS Specification 3.12 *Drop Test Specification* for IHLW. If the first 4.5-meter tall canister design fails the drop test, the Contractor shall redesign the 4.5-meter tall canister and submit the design to DOE. After DOE review, the canister shall be fabricated, filled with simulated HLW glass, sealed and subjected to drop testing. If the second 4.5-meter tall canister design fails the drop test, then DOE shall have the option of requesting a second redesign of the canister or specifying the 3-meter tall West Valley canister design.

iv. During the Part B-1 Contract period, the Contract shall perform static and dynamic finite element analysis of a filled and sealed protypical IHLW canister to demonstrate compliance with WAPS Specification 3.12 Drop Test Specification for IHLW. The IHLW glass should have a minimum density of 2.6 gram/cc and the container be filled to a minimum of 85 volume percent. The dynamic analysis shall include a load condition for a 7.0 meter drop onto a flat unyielding surface with the following drop orientations: flat top drop, flat side drop, and flat bottom drop. The static analysis should investigate the structural integrity under normal handling conditions. The contractor shall provide to DOE, within 20 months of the Part B-1 authorization to proceed a summary report which includes: criteria and inputs, methodology, assumptions, references, calculations and summary of results of the static and dynamic analysis. The results of this analysis shall demonstrate acceptability of the proposed IHLW canister design.

(g) ILAW Package Testing

i. The Contractor shall produce during the Part B-2 contract period, using proposed production plant operating conditions, at least one ILAW package having the package dimensions as defined in Specification 2.2.2.3, *Size and Configuration*, fill requirements as defined in Specification 2.2.2.5, *Void Space*, and sealed in accordance with Specification 2.2.2.12, *Closure and Sealing*. The

production plant conditions shall include prototypical glass fill rate and pour temperature, and a representative of the ILAW glass composition. The filled and sealed package shall be drop tested from a height of 12.5-meter between the bottom of the package and a flat, essentially unyielding surface. The drop shall be oriented, such that, the impact is likely to occur on the bottom corner of the package. The Contractor shall describe the drop test and provide testing results including photographs and measurements before and after the test to quantify the deformation and a potential package breach. Testing results shall be documented and provided to DOE in a separate technical report.

ii. Fill prototypical ILAW packages that have the same cross-sectional area as the proposed full-scale package to demonstrate the ability to achieve compliance with ILAW Specification 2.2.2.5, *Void Space*, and develop information for modeling package cooling rates. The package height shall be at least 0.7 meters.

6) Equipment Verification Analysis and Testing - On-line Monitoring of Technetium-99 in LAW Streams: The Contractor shall identify, test and evaluate methods to determine, on-line, the ^{99}Tc concentration in the pretreated LAW feeds. The Contractor shall demonstrate the capability of the method to detect ^{99}Tc at the concentration required to comply with the ILAW Specification 2.2.2.8, *Radionuclide Concentration Limitations.*

b. Design Studies and Documentation: Design Studies and Documentation Deliverables to be produced during Part B-1 of the Contract shall address the following areas and requirements:

1) Design Requirements

(a) Design Stage: During Part B-1, the Contractor shall complete all Process and Facility Design Documentation described in Section b of Standard 2, *Project Design Development*, to a level consistent with the Design Confirmation Stage as defined in the BNFL, Inc. TWRS "Design Process" to be issued for TWRS Project Activities which is based upon "BNFL Engineering Ltd., Business Model, A7 Work Package Implementation", issued February 1998. The level of design should be sufficient to support the basis for a Construction Authorization request, facility permitting, establishment of firm fixed prices for the treatment services and support financial closure.

(b) Definition of the Engineering and Design Standards: The Contractor shall comply with the engineering and design standards requirement document entitled BNFL, Inc. TWRS "Design Process" which is based upon "BNFL Engineering Ltd., Business Model, A7 Work Package Implementation" issued February 1998. The requirements document shall be submitted to DOE for information within 90 days of the Authorization to Proceed.

2) Design Reviews: The DOE staff, and other Hanford Site contractor staff identified by DOE, shall be invited as a participant to all major design reviews. Major design reviews are those that signify the completion of a Stage of Design or involve the discussion of significant issues associated with the establishment of the technical requirements for the design. The objective of DOE participation in the design review process is for DOE to obtain a clear understanding of the basis for the design and an understanding of risks associated with the design.

3) Functional Specification and Basis of Design: The Contractor shall prepare and issue to DOE for review and comment a functional specification for the HLW Pretreatment/Vitrification Facility, LAW Vitrification Facility and Balance of Plant Facilities, within 90 days of the Part B-1 Authorization to Proceed. Basis of design document(s) shall be provided in accordance with the IMP.

The functional specification and basis of design document(s) shall include facility functional requirements, design requirements, and design assumptions. The Contractor shall design the facilities to be consistent with the requirements of Standard 2 (Part B-1).b.1), *Design Requirements*, the functional specification and basis of design document(s), and requirements of the Contract.

4) Facility Design Requirements

(a) The Contractor's waste treatment facilities shall be designed to operate for 40 years. The LAW and HLW vitrification facilities shall have a design capacity sufficient to process the minimum order quantities within the contract period of performance.

(b) The Contractor shall design the waste treatment facilities such that the plant is capable of increased operational capacity. Specifically:

i. The plant shall have the ability to increase the LAW vitrification capacity from 30 metric-ton of glass per day (MTG/d) to 60 MTG/d by the addition of a parallel separate LAW vitrification plant.

ii. The HLW vitrification plant shall have the ability to expand the HLW Treatment Service capacity from 1.5 MTG/d to a minimum of 3.0 MTG/d and with the possibility of further expansion through performance enhancements to 6.0 MTG/d. This expansion is to be accomplished by including an additional HLW Vitrification cell in the original plant. Both cells shall be designed to incorporate potential vitrification system performance enhancements.

iii. The pretreatment capability shall be designed to support both the LAW and HLW vitrification services at the increased capacities and have radionuclide removal capability consistent with the scope defined in Section C.4, *Description of Services and Deliverables*.

iv. The waste treatment plant shall have the capability to receive and store 1.5 Mgal (5680 m^3) of LAW Feed. The design shall include

the capability to receive without interruption 1.0 Mgal (3780 m^3) of LAW feed while processing from the remaining capacity of 0.5 Mgal (1900 m3) of LAW feed.

v. The treatment facility shall have the capability to store 600 m^3 of entrained solids (defined in Specification 3, *Entrained Solids)*.

vi. The HLW immobilization facility shall have the capability to connect to a potential new facility designed to treat the Hanford Cs and Sr capsules prior to incorporation into the HLW feed for immobilization in the HLW vitrification facility.

(c) The Contractor shall provide for DOE review and comment a Facility Expansion Capability document that describes the technical requirements, schedule, and financial provisions to execute this potential plant expansion within 20 months after authorization to proceed with Part B-1. The Facility Capacity Expansion Capability document shall identify for each of the major facilities (Pretreatment, LAW Vitrification, HLW Vitrification and Balance of Facilities), the facility and process capabilities that will be installed in the original design to support capacity expansion and those capabilities that would be required to increase the peak capacity from 30 MTG/day ILAW and 1.5 MTG/d IHLW to 60 MTG/d for ILAW and up to 6.0 MTG/d IHLW, including any impacts to the Interface Description requirements. This identification should include process vessels (number, function and capacity), facility expansion features, site arrangement drawings, and specific changes to DOE-Contractor interface requirements. The projected cost and schedule to provide these additional capabilities should be identified. The Expanded Facility shall also be modeled with the Operational Research Assessment Model in accordance with paragraph 5) (b), and a summary report provided to the DOE for review and comment within 20 months after the authorization to proceed with part B-1.

(d) The Contractor shall provide for DOE review and comment a Facility Design and Operations Philosophy document within 90 days after authorization to proceed with Part B-1. The document shall include at a minimum:

i. A description of the Operational Research (OR) model for the facility that discusses features to ensure plant online availability, reliability, and maintainability. The OR model shall be updated during Part B-1 to reflect the design progression, and a copy of the analysis results shall be provided to DOE when updates are made by the Contractor.

5) Process Design Products

(a) Control System Requirements: The control system strategy and requirements for the Pretreatment/HLW Vitrification and LAW Vitrification production facilities shall be specified. The control system strategy shall state the operational characteristics of the facilities, requirements for the

control and operational system, and sampling and analytical requirements for the operation of the facilities.

(b) Operations Research Assessment of the Plant: Operations Research assessments of the Pretreatment/HLW Vitrification Plant and LAW Vitrification production facilities shall be conducted to determine where the facility design concept is at risk in meeting plant capacity requirements or where costs can be reduced in construction and operations. The scope of the assessments shall include: sampling and analysis requirements including sample turnaround times, assessments of tank capacities, time for mechanical handling steps, equipment reliability, time estimates for maintenance and repair of facility and process systems, estimated spare equipment inventory, and recommendations to improve reliability of the production facilities.

(c) Process Flow Diagrams and Material Balances

i. Process flow diagrams for the Pretreatment Plant, HLW Vitrification Plant and LAW Vitrification Plant shall be completed to the design confirmation stage of the A7 manual.
The process flow diagrams shall identify all main process equipment including in-cell equipment and supporting equipment for cold chemical makeup. Supporting documentation (system descriptions, data sheets and appropriate references) shall specify the capacity and duty of the equipment systems, the process scheme and sequence description and operating conditions.

ii. Material balance flow sheets for the treatment of the feed envelopes shall be established based upon process testing information and the waste feed composition information. The level of detail in the material balance shall be consistent to the level of detail required by: Specification 1, *Immobilized High-Level Waste*; Specification 2, *Immobilized Low-Activity Waste*; Specification 3, *Entrained Solids*; Specification 7, *Low-Activity Waste Envelopes Definition;* Specification 8, *High-Level Waste Envelope Definition*; and Specification 11, *Pretreated Low-Activity Waste*; the returned liquid effluents; and the dangerous waste components identified in the DWPA.

(d) Process and Instrument Diagrams: Process and instrument diagrams (P&ID) for the Pretreatment/HLW Vitrification and LAW Vitrification and supporting facilities shall be completed to a level consistent with the design confirmation stage as defined in Standard 2.(Part B-1).b.1), *Design Requirements.* The P&ID's shall identify all process and support equipment, preliminary instrument and electrical requirements, and pipe sizes and line numbers. The control systems and type shall be identified on the drawings.

(e) Instrument and Control Diagrams/Design: Instrument and control diagrams for the Pretreatment/HLW Vitrification and LAW Vitrification facilities shall be completed to a level consistent with the design confirmation stage as defined in Standard 2.(Part B-1).b.1), *Design Requirements*. These diagrams/design documentation shall include control system specifications, identification of the main control interface, configuration diagrams, and sequence and interlock requirements. The instrument schedules shall be defined in the design documentation. This design shall include features to address safety and product acceptance.

(f) Electrical Diagrams: Electrical one-line diagrams for all process and facility systems shall be completed to a level consistent with the design confirmation stage as defined in Standard 2.(Part B-1).b.1), *Design Requirements*. Electrical loads and systems shall be identified. The basis to support specification of the electrical systems shall be identified.

(g) Equipment Design/Equipment Arrangement Diagrams: The design of all in-cell process equipment for the Pretreatment/HLW Vitrification and LAW Vitrification facilities shall be completed to a level consistent with the design confirmation stage as defined in Standard 2.(Part B-1).b.1), *Design Requirements*. Balance of Plant equipment shall be included in these diagrams. Equipment design data sheets shall be completed for all process equipment components. Equipment general arrangement drawings shall specify plan and elevation views.

(h) Equipment Arrangement and Piping Diagrams: Hydraulic piping diagrams shall be completed to a level consistent with the design confirmation stage as defined in Standard 2.(Part B-1).b.1), *Design Requirements*, for the Pretreatment/HLW and LAW Vitrification facilities that identify pipe routing in plan and elevation views. Critical systems shall be modeled using three-dimensional analysis to assure that equipment systems are correctly positioned and primary cell penetration requirements are identified.

(i) Process Design Products shall be provided to DOE for information as part of the design review process.

(j) Three Cumulative Plant Performance Profiles (for pretreatment, HLW and LAW) will be developed that define the cumulative amount of waste to be processed by BNFL as a function of time. The Cumulative Plant Performance Profile for pretreatment will cover the Commissioning period only. The Cumulative Plant Performance Profiles for HLW and LAW will cover the Commissioning and Facility Commercial Operation periods and will define the cumulative amount of waste processed as a function of time required to complete the MOQ within the period of treatment services as specified in Section F of the Contract.

Each Cumulative Plant Performance Profile shall be consistent with the requirements for achievement of Facility Commercial Operation (per clause H.45) and be directly traceable and linked to the following minimum products completed during Part B-1 of the contract for all three systems

(pre-treatment, low-activity waste immobilization, high-level waste immobilization): process flow diagrams (that include all major process equipment, size and operational requirements); material balance (that integrates processing of all four waste envelopes); preliminary process and instrumentation drawings (that identify all process and support equipment size and performance requirements); operations research assessment; risk management processes; and the operational scenario presented in the final Integrated Master Plan.

Drafts of the Cumulative Plant Performance Profiles shall be provided to DOE for review no later than 18 months after the start of Part B-1.

(k) Base Capacity Payment (BCP) Cumulative Pay-Performance Curves for HLW and LAW treatment services will be developed. These BCP Cumulative Pay-Performance Curves will cover the Facility Commercial Operation period and will define the cumulative amount of waste processed, as a function of time, required to earn all Base Capacity Unit Payments within the period of treatment services as specified in Section F of the Contract.

The BCP Cumulative Pay-Performance Curve for each waste treatment service will define the cumulative amount of waste processed as a function of time for that waste treatment service (within the period of treatment services, as specified in Section F of the Contract) required to complete that portion of the minimum order quantity that is equal to the quotient of the total sum of base capacity payments divided by the total sum of minimum order quantity payments.

Drafts of the BCP Cumulative Pay-Performance Curves shall be provided to DOE for review no later than 18 months after the start of Part B-1.

6) Facility Design Products shall be provided to DOE for information as part of the design review process.

(a) Facility Ventilation System Design: The ventilation flow diagrams and HVAC system design for the Pretreatment/HLW Vitrification, LAW Vitrification, and support facilities shall be completed to a level consistent with the design confirmation stage as defined in Standard 2.(Part B-1).b.1), *Design Requirements*. The diagrams shall identify the individual systems, all equipment components, and routing within and between the facilities. Sample locations and methods shall be specified. Equipment to provide motive force and ventilation control shall be identified.

(b) Facility Civil, Structural and Architectural Design: The civil, structural and architectural designs of the Pretreatment/HLW and LAW Vitrification facilities shall be completed to a level consistent with the design confirmation stage as defined in Standard 2. (Part B-1).b.1), *Design Requirements*. The civil, structural and architectural design for the Balance of Facility, shall be completed. The building sizes,

location and requirements of load-bearing, shielding and internal walls shall be identified. Major penetrations in walls and floors shall be identified. All crane structures, filter housings, and facility mechanical systems shall be identified. Seismic analysis for the facilities for Pretreatment/HLW Vitrification, LAW Vitrification, and support facilities shall be completed per requirements of the Regulatory Unit and Ecology to support structural analysis, definition of the facility, the Limited Work Authorization Request, and Construction Authorization Request.

(c) Mechanical Flow Diagrams: Mechanical flow diagrams for the Pretreatment/HLW Vitrification, LAW Vitrification, and support facilities shall be completed to a level consistent with the design confirmation stage as defined in Standard 2.(Part B-1).b.1), *Design Requirements*. The diagrams shall be prepared with sufficient detail to support the Hazards Analysis Review. The diagrams shall identify mechanical equipment and each step and sequence of the operation.

7) Site and Facility Arrangement Drawings: Site and facility drawings for all facilities and structures shall be completed. These drawings shall identify all above-grade and below-grade structures, piping, and instrumentation systems. The drawings are to reflect requirements during the construction and the operations phase of the project. Site drawings and documents shall be provided to DOE for review and concurrence as part of the design review process. Facility drawings and documents shall be provided to DOE for review and comment.

8) Balance of Facility Design shall consist of the following:

(a) Piping and Instrumentation Drawings (P&ID) for supporting facilities (utilities etc.) shall be completed to a level adequate to support the fixed price estimate, the limited construction application, the Dangerous Waste Permit Application and meet the Stage A requirements of the A7 process.

(b) The civil, structural and architectural design for the Balance of Facility shall be completed to a level adequate to support the fixed price estimate, limited construction application and the Dangerous Waste Permit Application. This shall include the general arrangements of the facilities, cross sections of the more complex buildings and a facility description, which includes the function, purpose and the codes, and standards to which it will be constructed.

(c) Electrical one line diagrams for Balance of Facility systems shall be produced to adequately support the fixed price estimate, limited construction application and the Dangerous Waste Permit Application.

9) LAW Conditioning Plant Design: For the facility housing the Tc pretreatment, LAW evaporator and resin packaging the design shall by 07/24/00 reach the design confirmation stage of the A7 process and by 4/24/00 include the following:

(a) Piping and Instrumentation Drawings (P&ID) shall be completed to a level adequate to support the fixed price estimate, the limited construction

application, the Dangerous Waste Permit Application and meet the Stage A requirements of the A7 process.

(b) The civil, structural and architectural design for the LAW Conditioning Plant design shall be completed to a level adequate to support the fixed price estimate, limited construction application and the Dangerous Waste Permit Application. This shall include the general arrangements of the facilities.

(c) Electrical one line diagrams for the LAW Conditioning Plant systems shall be produced to adequately support the fixed price estimate.

c. Construction Planning Deliverables: Construction planning deliverables to be produced during Part B-1 of the Contract shall address the following areas:

1) Engineering Execution Plan: An Engineering Execution Plan shall be prepared that defines codes and standards, automation and software, organization and interfaces, and design packaging to be used for procurement and construction release. This Engineering Execution Plan shall be issued to DOE 90 days after Part B-1 Authorization.

2) Construction Strategy: The Contractor shall prepare a Construction Strategy Document that addresses the fundamental requirements of the construction phase including: definitive construction requirements, cost estimating requirements, staffing requirements, identification of subcontractors, fabrication strategy, planning, and management of facility construction.

3) Construction Mobilization Plan: An initial construction plan focused on the preparation of the site shall be prepared. This plan shall include site preparation requirements, minimization of site construction and facility construction impacts, identification of subcontractors, fabrication strategy, planning, clearing and grubbing requirements, space requirements, establishment of temporary utilities, facilities to complete construction activities, and staffing requirements.

4) Construction Information Packages: Initial information packages to initiate construction shall be prepared. During Part B-1, the scoping information packages for the site preparation and the initial construction of the Pretreatment, IHLW and ILAW foundations (outline only, no rebar) shall be prepared. The construction information packages shall include temporary construction facilities, temporary site utilities, and the concrete batch plant. The content of the information packages shall include:
   (a) a plot plan that includes the location of temporary facilities and utilities
   (b) Drawings of the temporary facilities (layout, floor plan, or general arrangement)
   (c) Drawing of temporary utilities needed to support construction
   (d) Batch plant
   (e) Early plant equipment list (major items)
   (f) Crane list and crane work plans
   (g) List of early vessels

5) Facility Acceptance Strategy: The Facility Acceptance Strategy shall be established to assure that requirements for pre-operational testing and acceptance of the process and facility systems are factored into the detailed design of the facility.

6) Procurement Work Packages: Work packages to support the initial procurement needs of the facility shall be prepared. These will include the reinforcing steel, and chemicals and equipment to begin the initial foundation work for the facility.

7) Early Construction Procurement Study: By December 27, 1999, the Contractor shall provide to DOE, for review and concurrence, a detailed schedule comparison that determines how much schedule acceleration can be obtained through procurement of construction equipment, supplies and long lead items, prior to the start of Part B-2.

This study shall, at a minimum, determine: 1) all early procurements necessary for optimal schedule enhancement, and 2) a case that optimizes schedule with minimal early expenditure (e.g., items and activities on the critical path). Both cases shall be traceable to the IMP and include schedule enhancement rationale and costs for all proposed early procurements.

8) Construction planning deliverables: Unless noted, shall be provided to DOE for review and comment as they are produced and no later than 20 months after the Part B Authorization to Proceed.

d. System Analysis and Optimization: The Contractor shall perform system analysis and optimization studies of the initial waste treatment systems and facilities the Contractor presented during Part A. All system analysis and optimization studies shall be identified on the IMP, and except for the optimization plans required pursuant to 2)(i) below, which shall be submitted twenty (20) months after notice to proceed with Part B-1, completed within four months of the Authorization to Proceed with Part B-1.

During the performance of the system analysis and optimization studies, the Contractor shall use the Interface IPT established during Part A to provide status information on these studies, and to define, manage, and control all system interfaces between the Hanford Site and the Contractor.

1) System analysis and optimization studies shall be submitted as a formal engineering report, and shall include the following information:

(a) Describe specific system and/or facility to be analyzed/optimized;

(b) Identify specific requirements that are allocated to the systems and facilities to be optimized;

(c) Identify reasonable alternatives that will meet the specific requirements;

(d) Define evaluation criteria that will be used to analyze alternatives, including the ability to meet waste treatment system performance requirements; initial capital and life-cycle cost performance; and reliability, availability, maintainability, and inspectability;

(e) Analyze alternatives using evaluation criteria;

(f) Evaluate results and recommend preferred alternative;

(g) Establish risk and uncertainty;

(h) Describe waste treatment system, facility, other technical, cost, and schedule impacts that result from implementation of the change; and

(i) Describe impacts to permits, safety authorization basis, safety requirements and source terms.

2) The Contractor is responsible for defining all required system analysis and optimization studies to be conducted during Part B-1 of this Contract. DOE and the Contractor will evaluate results of the system analysis and optimization studies in the Interface IPT. The Contractor and DOE will then decide whether to implement the IPT recommendation. If the implementation of the recommendation would result in a material impact to the Contractor's waste treatment system, Hanford system, and/or requirements of this Contract, DOE and the Contractor will agree upon any required changes, if any, to the terms and conditions of the Contract. The following minimum areas of system analysis and optimization shall be performed:

(a) Optimization of waste treatment system and facility concepts (e.g., phased capacity, facility expansion, etc.) to identify potential benefits in terms of cost, schedule and mission achievement across the TWRS privatization project. Alternative scenarios may be studied for comparison. Such scenarios shall be developed jointly by the Contractor and DOE and be agreed to by DOE before the study is undertaken.

(b) Optimization of waste treatment system and facility (e.g., phased capacity, facility expansion, etc.) to achieve lower and upper planning limits of HLW pretreatment and immobilization.

(c) Capability to process the cesium capsules at a rate sufficient to process the capsules within a 5 to 10-year period after hot start of the HLW immobilization service.

(d) Capability to process the strontium capsules at a rate sufficient to process the capsules within 5 to 10-year period after hot start of the HLW immobilization service.

(e) Capability to reduce the volume of immobilized LAW from Envelope B by blending in the Contractor's facility the pretreated LAW Envelope B with Envelope A or C.

(f) Capability to pretreat HLW in accordance with Specification 12, *Number of HLW Canisters Per Batch of Waste Envelope D.*

(g) Optimization of technical specifications, waste treatment system, and facilities to evaluate, at a minimum:

i. Study of the waste treatment system and facility impacts to produce: 1) alternative vitrified LAW waste forms (e.g., cullet, gems, or small monoliths), and 2) alternative LAW waste forms (e.g., cementitious).

ii. Packaging optimization of the alternative LAW waste forms. This study shall include deformation, sealing, and decontamination requirements and reusable packaging for transport of the waste forms to the DOE storage/disposal facility. The study shall estimate the impacts to the DOE storage/disposal facility design.

iii. Identification of LAW (Specification 7, *Low-Activity Waste Feed Envelops Definition)* and HLW (Specification 8, *High-Level Waste Envelope Definition)* feed specification extremes that may affect facility design requirements.

iv. Identification of cost savings associated with reducing the lag-storage requirements for each of the immobilized waste products and intermediate waste products from 60 days to 30 days or 15 days.

v. Potential benefits of the Contractor operating two feed staging tanks (241-AP-106 and 241-AP-108) or switching from tank 241-AP-106 to tank 241-AP-108.

(h) Providing LAW feed receipt, pretreated LAW storage, and Entrained Solids storage capability of approximately 2,000 to 4,000 cubic meters. Options shall include one large tank or multiple tanks.

(i) Optimization of processing delivery for both the minimum order quantities and for amounts processed above the minimum order quantity within the period of Contract performance identified in Section F. Implementation of plans for such optimization will require coordinated actions by the Contractor, DOE and the Site contractor. As such, development of a plan for processing delivery optimization will be led by the Contractor but will also involve the participation of DOE and the Site contractor.

Standard 3: Product Qualification, Characterization, and Certification

The *Products and Secondary Wastes Plan* was submitted as a Part A deliverable. The purpose of this *Standard* is to describe requirements for Contractor revision and DOE approval of the *Products and Secondary Wastes Plan* during Part B-1, and implementation of the *Products and Secondary Wastes Plan* during Part B.

Product Qualification, Characterization, and Certification activities and deliverables shall be integrated with all technical, regulatory, and business and finance aspects of this project.

a. The Contractor shall:

   1) Identify and describe each immobilized waste product, intermediate waste product, and secondary waste to be produced or generated under this Contract,

   2) Conduct those activities necessary to qualify each immobilized waste product and intermediate waste product in order to provide confidence, prior to production operations, that the products will conform to the specifications and requirements in the Contract, and

   3) Conduct those activities necessary during production operations to characterize and provide a basis for certification that the immobilized waste products, secondary waste products, and secondary wastes conform to the specifications and requirements in the Contract.

b. The Contractor shall prepare a *Products and Secondary Wastes Plan* describing their plan for qualification, characterization, and certification of each immobilized waste product, intermediate waste product, and secondary waste included under this Contract. The *Products and Secondary Wastes Plan* shall provide the following information:

   1) Identification and description of each immobilized waste product, intermediate waste product, and secondary waste. The description shall include chemical and radiochemical composition, physical properties, and a comparison to Contract requirements.

   2) Planned methods and documentation to qualify each immobilized waste product and intermediate waste product.

   3) Planned methods and documentation to characterize and provide a basis for certification that each immobilized waste product, intermediate waste product, and secondary waste meet Contract requirements.

   4) Planned methods and documentation to comply with dangerous and hazardous waste regulations identified as required in the Contract.

   5) Identification and description of documentation to be provided with each product package submitted for acceptance or waste submitted for transfer that describes the product, documents characterization activities, and provides a basis for certification that the product or waste conforms to the Contract requirements.

c. During Part B, the Contractor shall complete the following activities and prepare the documentation identified in Table S3-1, *Product Qualification, Characterization, and Certification Documentation*:

1) Revise the *Products and Secondary Wastes Plan* incorporating DOE's comments and submit the revised *Products and Secondary Wastes Plan* to DOE for concurrence.

2) Prepare for DOE review and comment a separate *Waste Form Compliance Plan* (WCP) based on the *Products and Secondary Wastes Plan* to address specifically the requirements of the *Waste Acceptance Systems Requirements Document* (WASRD) and *Waste Acceptance Product Specifications* (WAPS) identified in Specification 1, *Immobilized High-Level Waste*.

3) Implement the DOE-approved *Products and Secondary Wastes Plan* and *Waste Form Compliance Plan* including all planned qualification and characterization activities.

4) Prepare qualification documentation for DOE review and comment for ILAW, IHLW and Entrained Solids. The qualification documentation shall address each requirement of each specification and shall compile the results of testing, analyses, demonstrations, and inspections to demonstrate that each product will comply with Section C.6, *Specifications* of the Contract.

5) Prepare a separate *Waste Form Qualification Report* (WQR) for DOE review and concurrence to address specifically the requirements of the WASRD and WAPS identified in Specification 1, *Immobilized High-Level Waste*. The Contractor shall provide documentation and technical support to DOE-RL as DOE-RL pursues concurrence of the WQR.

6) In accordance with Standard 4, DOE will be responsible for petitioning for an exemption or exclusion for the removal of the IHLW product from RCRA and HWMA regulation. The Contractor shall develop the approach to be undertaken and provide all information and technical support necessary to apply for the exemption and/or exclusion. If the exemption or exclusion is obtained, the Contractor shall implement the necessary procedures to provide IHLW that is exempted or excluded from RCRA and HWMA.

Table S3-1. Product Qualification, Characterization, and Certification Documentation

Deliverable Description	Reference	Part A Deliverables	Part B Deliverables				
				Part B-2			
			Part B-1	Construction	Facility Start-Up	Production Operations	Deactivation
Immobilized High-Level Waste							
Products and Secondary Wastes Plan	Standard 3	Draft	Final	Update	Update		
Waste Form Compliance Plan (WCP)	Standard 3 and Specification 1		Draft And Final	Update	Update	Update	
IHLW Qualification Documentation	Standard 3 and Specification 1		Preliminary IHLW Qualification Report	Update	Final	Update	
Waste Form Qualification Report (WQR)	Standard 3 and Specification 1		Outline And Preliminary WQR	Draft for Review	Final	Update	
Production Records and Storage Records	Standard 3 and Specification 1			Draft for Review	Final for each Canister	Final for each Canister	
Immobilized Low-Activity Waste							
Products and Secondary Wastes Plan	Standard 3	Draft	Final	Update	Update		
ILAW Qualification Documentation	Standard 3 and Specification 2		Preliminary ILAW Qualification Report	Update	Final	Update	
ILAW Production Documentation	Standard 3 and Specification 2			Prototype	Final for each Package	Final for each Package	
Entrained Solids							
Products and Secondary Wastes Plan	Standard 3	Draft	Final	Update	Update		
Entrained Solids Qualification Documentation	Standard 3 and Specification 3		Preliminary Entrained Solids Qualification Report	Update	Final	Update	
Entrained Solids Production Documentation	Standard 3 and Specification 3			Prototype	Final for each transfer	Final for each transfer	
Pretreated Low-Activity Waste							
Products and Secondary Wastes Plan	Standard 3	Draft	Final	Update	Update		
Pretreated LAW Qualification Documentation	Standard 3 and Specification 11		Preliminary Qualification Report	Update	Update		
Pretreated LAW Production Documentation	Standard 3 and Specification 11			Prototype	Final	Final	

Deliverable Description	Reference	Part A Deliverables	Part B Deliverables				
			Part B-1	Part B-2			
				Construction	Facility Start-Up	Production Operations	Deactivation
Secondary Wastes							
Products and Secondary Wastes Plan	Standard 3	Draft	Final	Update	Update		
Secondary Wastes Production Documentation	Standard 3 and Interface Descriptions 3, 4, 5, 6, 7, 8, and 22			Prototype	Final	Final	Final
Product Quality Assurance							
Quality Assurance Provisions Document	Standard 3		Draft and Final	Update	Update	Update	

7) Prepare production documentation for ILAW and IHLW waste products, entrained solids, and secondary wastes. The production documentation shall document the testing, analyses, demonstrations, and inspections to characterize each product package, canister, or liquid stream for transfer and secondary wastes and to provide a basis for certification that each product and secondary waste complies with Section C.6, *Specifications*, and requirements of the Contract.

8) Submit to DOE all required documentation that qualifies, characterizes, and certifies each immobilized waste product, intermediate waste product, and secondary waste conforms to Contract requirements.

9) Proposed ILAW glass composition ranges shall be provided to DOE no less than 1 year before production of glasses in that range.

d. Prepare for DOE concurrence a document that describes the Contractor's Quality Assurance provisions for product development, qualification characterization, and certification requirements of each of the primary, intermediate, and secondary waste products to be incorporated in the Contractor's Quality Assurance (QA) Plan(s).

e. All qualification and characterization activities conducted during Part B shall be performed under a Contractor Quality Assurance Program that addresses the quality assurance provisions prepared per paragraph d. of this Standard.

f. DOE shall have the right to access Contractor facilities, personnel, and records for the purpose of conducting quality assurance surveillances and audits. These QA oversight activities by DOE include, but are not limited to:

1) Review of Contractor-developed:

i. QA Program plans and implementing procedures applicable to those activities affecting product quality (e.g., application of the *Quality Assurance Requirements and Descriptions for the Civilian Radioactive*

Waste Management Program (QARD), DOE/RW-0333P, to studies that will produce data expected to be used for high-level waste form qualification).

ii. Process for immobilized high-level waste form qualification.

iii. Analytical processes performed in support of waste form development and qualification.

iv. Waste Form Compliance Plan (WCP) and Waste Form Qualification Reports.

v. Process control software design and implementation plans and procedures.

vi. Process for immobilized low-activity waste form and package qualification.

2) Performance of surveillances during implementation of the activities, plans, and procedures listed in paragraph f.1) above.

3) Audits of implementation of the Contractor Quality Assurance Plan. The first audit will be conducted within 90 days of DOE concurrence with the Contractor Quality Assurance Plan.

g. The Contractor shall qualify and characterize the immobilized waste products, intermediate waste products, and secondary wastes using analysis, testing, inspection, and demonstration as defined below as appropriate for each specification or requirement as shown in Table S3-2, *Qualification and Characterization*.

Table S3-2. Qualification and Characterization

Requirement	Qualification	Product Characterization
Chemical and Radiochemical Composition	A, D, I, T	A, D, I, T
Dangerous and Hazardous Wastes	A, D, I, T	A, D, I, T
Waste Loading	A, D, T	A, D, T
Waste Form Leaching/Durability	A, T	A, T
Waste Form Stability	A, D, T	D
Free Liquids, Explosivity, Pyrophoricity, Organic Materials, and Gases	A, D, I	A, D, I
Heat Generation and Surface Temperature	A	A
Dose Rate and Criticality	A	A, I
Package and Canister Dimensions	D, I	D, I
Weight and Mass	A, D, I	D, I
Void Space and Fill Height	D	D, I
Package and Canister Materials	D, I	D, I
Package and Canister Mechanical Strength	A, D, T	D
Labeling	D, I	I
Package and Canister Handling Features	D, I	D, I
Package and Canister Closure and Sealing	D, I	D, I
Surface Contamination	D	D, I

Legend
A = Analysis
D = Demonstration
I = Inspection
T = Testing

Definition of Terms: The following terms and definitions shall apply to Standards 2 and 3 of this Contract.

Analysis (A) — As used in the specifications, an analysis is a set of engineering or scientific calculations that demonstrate that a product meets or exceeds a specification requirement. These calculations are typically based upon available data and assumptions regarding process operating conditions or materials. Analysis is required to identify conditions or assumptions which might limit validity and to identify specific documentation or measurements made during production to ensure validity (waste loading, container material, process additives, process measurements, etc.). Analyses shall be conducted and documented in sufficient detail that a knowledgeable technical person can review and concur in their accuracy and validity. Evidence of peer review for accuracy for each analysis shall be provided. An analysis will be considered to demonstrate compliance with specification requirements when: a) it has been approved by DOE; and b) when the conditions for validity or assumptions have been verified by independent means (e.g., process control records, raw material certifications).

Demonstration (D) — A demonstration is the proof-of-principle of a specimen, article, or process test used to verify its conformance to the conditions of an analysis or product specification. Demonstrations are conducted where analysis is insufficient to provide proof-of-product acceptability or where analysis indicates the need for verification of assumptions (e.g., waste loading, explosivity, scale-up, process control). Demonstration reports shall identify: a) the demonstration being conducted; b) the limits of the demonstration's validity; and c) those inspections or tests that will be conducted during operations to confirm that the demonstration results are still applicable to the product being produced. Proposed demonstrations will be submitted as part of the *Products and Secondary Wastes Plan.* A demonstration will constitute verification of compliance with a specification requirement when: a) it has been approved by DOE; and b) when the conditions for validity or assumptions have been verified by independent means (e.g., process control records, raw material certifications) during operation.

Inspection (I) — Inspection is a non-destructive examination or measurement of a product characteristic that confirms compliance with product specifications. Inspections are conducted when product characteristics can be easily determined by direct measurement (weight, dimensions, labeling, external temperature, etc.) or where the results of the calculations leave some doubt as to satisfaction of the product requirements.

Test (T) — A test is the evaluation of a product characteristic in which representative samples are destructively examined or measured to confirm compliance with product specifications. Tests are typically conducted where product characteristics cannot be readily determined by inspections, or where an inspection by itself, does not provide adequate confirmation of compliance (e.g., chemical composition, radionuclide release rate). Upon request by DOE, the Contractor shall split and provide DOE with samples obtained from or representative of the delivered products. The Contractor is responsible for defining what constitutes a statistically representative sample (e.g., based on the extent of process control achieved for that product).

Qualification — Qualification is composed of those activities conducted by the Contractor to provide confidence, prior to full-scale production operations, that the planned immobilized waste products, intermediate waste products, and secondary wastes will conform to the specifications in the Contract.

Characterization — Characterization is composed of those activities conducted by the Contractor to provide confidence that the actual immobilized waste products, intermediate waste products, and secondary wastes produced during production operations conform to the specifications and requirements in the Contract.

Certification — Certification is the endorsement or guarantee by the Contractor that an immobilized waste product, intermediate waste product, or secondary waste conforms to the Contract requirements and specifications.

Validation — Validation is composed of those activities conducted by the Contractor with actual wastes or with full-scale process equipment to confirm that the results of the analyses, demonstrations, inspections, and test(s) conducted by the Contractor to qualify a product or process are representative of the product and process characteristics.

Verification — Verification is composed of those activities conducted by DOE to confirm that an immobilized waste product, intermediate waste product, or secondary waste conforms to the Contract requirements and specifications.

Standard 4: Safety, Health, and Environmental Program

The purpose of this Standard is to: 1) define Contractor responsibilities for conventional non-radiological worker safety and health; radiological, nuclear, and process safety; and environmental protection; and 2) identify specific deliverables the Contractor shall submit during Part A, Part B-1, and Part B-2.

a. The primary objectives of the Safety, Health and Environmental Program are to:

1) Demonstrate compliance with established requirements;

2) Apply best commercial practices to provide conventional non-radiological worker safety and health protection; radiological, nuclear, and process safety, and environmental protection, and

3) Implement a cost-effective program that integrates safety, health, and environmental protection in all Contractor activities.

Safety, health and environmental program activities and deliverables shall be integrated with all technical, regulatory and business finance aspects of this project.

b. The Contractor is responsible for providing safe and healthful working conditions for employees and all other persons under the Contractor's control who work in the general vicinity of the Contractor site, including subcontractors. The Contractor shall develop and implement an integrated program for conventional non-radiological worker safety and health; radiological, nuclear, and process safety; and environmental protection. During Parts B-1 and B-2, the Contractor shall implement its program, and submit the Part B deliverables described in paragraph c of this *Standard*.

c. The specific deliverables and program requirements are divided into three categories: non-radiological worker safety protection; radiological, nuclear, and process safety; and environmental protection. The deliverables shall reflect the current degree of design and project maturity. The following deliverables are required in each area of the Safety, Health, and Environmental Program:

1) Non-radiological Worker Safety and Health

(a) The Contractor shall develop and implement an integrated standards-based safety management program that: 1) defines policies and procedures for protecting employees from conventional workplace hazards, and 2) ensures compliance with all applicable Federal, State, and local safety and health codes, regulations and standards including regulations of the WISHA and the OSHA.

The Contractor's safety management program shall reflect proven principles of safety management and work planning that promote accident prevention, employee involvement, and sound hazard analysis and control.

2) Radiological, Nuclear, and Process Safety

(a) The Contractor shall develop and implement an integrated standards-based safety management program to ensure that radiological, nuclear, and process safety requirements are defined, implemented, and maintained. Radiological, nuclear, and process safety requirements shall be adapted to the specific hazards that are identified with the Contractor's waste treatment services.

(b) The Contractor's integrated standards-based safety management program shall be developed to comply with the specific nuclear safety regulations defined in the effective rules of the 10 CFR 800 series of nuclear safety requirements and with the regulatory program established in the following four documents:

i. DOE/RL-96-0003, *DOE Regulatory Process for Radiological, Nuclear, and Process Safety for TWRS Privatization Contractors*;

ii. DOE/RL-96-0004, *Process for Establishing a Set of Radiological, Nuclear, and Process Safety Standards and Requirements for TWRS Privatization*;

iii. DOE/RL-96-0005, *Concept of the DOE Regulatory Process for Radiological, Nuclear, and Process Safety for TWRS Privatization Contractors*; and

iv. DOE/RL-96-0006, *Top-Level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors.*

Revisions to the above four documents are acceptable if the changes are mutually agreed to by the Contractor and the Regulatory Official and do not impact project cost or schedule. Prior to implementation, the Contractor shall certify to the Contracting Officer that these changes do not adversely impact cost or schedule. Changes not mutually agreed upon to the above four documents will be dispositioned under Section H.28, *Uncontrollable Circumstances.*

The integrated standards-based safety management program shall integrate the appropriate planning and practices elements specified in 29 CFR 1910.119, *OSHA Process Safety Management of Highly Hazardous Chemicals.*

(c) The Contractor's Integrated Safety Management Plan shall conform with both RL/REG-97-13, *Regulatory Unit Position on Contractor-Initiated Changes to the Authorization Basis*, and RL/REG-98-14, *Regulatory Unit Position on New Safety Information and Back-fits*; and accept

i. RL/REG-98-05, *Inspection Program Description for the Regulatory Oversight of TWRS Privatization Contractors,* and

ii. RL/REG-98-06, *Corrective Action/Enforcement Action Program Description*.

Revisions to the above four documents are acceptable if the changes are mutually agreed to by the Contractor and the Regulatory Official and do not impact project cost or schedule. Prior to implementation, the Contractor shall certify to the Contracting Officer that these changes do not adversely impact cost or schedule. Changes not mutually agreed upon to the above four documents will be dispositioned under Section H.28, *Uncontrollable Circumstances.*

(d) The Contractor shall prepare and submit to DOE for information and to the Regulatory Unit for review and approval, the radiological, nuclear, and process safety deliverables defined in Table S4-1, *Radiological, Nuclear, and Process Safety Deliverables for Part A and Part B.* Each deliverable is structured around the following six actions:

i. Standards Approval;
ii. Initial Safety Evaluation;
iii. Authorization for Construction;
iv. Authorization for Production Operations;
v. Oversight Process Determination; and
vi. Authorization for Deactivation.

(e) The Contractor shall submit, sufficiently in advance of the submission (at least 14 weeks) of the Construction Authorization Request to enable review and approval by the Regulatory Official, a revised Standards Approval Package, complete with all necessary supporting documentation. The four required elements of the Standards Approval Package may be incrementally submitted for review. The scope and content of the submittal shall be in accordance with the requirements for a Construction Authorization Request as stipulated in Section 4.3.2, *Contractor Input*, Items 6) and 8) of DOE/RL-96-0003, *DOE Regulatory Process for Radiological, Nuclear, and Process Safety for TWRS Privatization Contractors.*

(f) Seven months prior to the need for approval of the Authorization to Proceed with construction, the Contractor shall submit the Construction Authorization request, with the exception of the Standards Approval Package submitted in paragraph C.2)(e) of this *Standard*, for review and approval by the DOE Regulatory Official.

(g) At six months from authorization to proceed with Part B-1, the Contractor shall submit to the DOE Regulatory Unit for review and comment (as defined in Table C4-2.1 of Section C of the Contract) a generic detailed description of the design safety features that will be incorporated into the waste treatment facility design. The description shall include the Contractor's approach to defense in depth and shall describe generic design features that are relied upon for safety and protection of the environment.

The document shall describe design features, not consequences or risk analyses.

Within two months from authorization to proceed, and prior to work commencing on the deliverable, the Contractor and the DOE Regulatory Unit shall develop and agree upon the scope and content of this design safety features deliverable.

(h) The Regulatory Unit and the Contractor shall conduct periodic, approximately monthly, topical meetings. The subject and time of the meetings should be set to an agreed prearranged schedule. These meetings will be conducted in accordance with a pre-arranged protocol. The Regulatory Official will establish the minimum content of the meetings. To the extent practicable, the outcome of a meeting should result in the regulatory closure of the topic. Closure will result from approval of submitted written correspondence.

These meetings will be held in accordance with DOE RL/REG-97-04, *Policy for Openness and Openness Plan for the Office of Radiological, Nuclear, and Process Safety Regulation of the TWRS Privatization Contractors*.

(i) Members of the Regulatory Unit may observe design reviews (and question the presenters) performed by the Contractor Safety Design Review Committees and Safety Review Committees, as ex-officio members. These reviews should be scheduled so that the evolving design is completely reviewed at least semi-annually. These observations provide the Regulatory Official with continuing information concerning the safety aspects of the evolving design and do not constitute regulatory approval of the matters discussed. In so far as practicable, the Regulatory Unit will utilize the same individuals as representatives over the course of the design.

(j) An Authorization Request associated with a particular Regulatory Action *may* be segmented and incrementally submitted. The Regulatory Unit review of a deliverable begins with receipt of the last component of the deliverable. For each request, the Contractor shall demonstrate the need for the phased authorization and provide sufficient detail in the request for the Regulatory Unit to review the request and reach an approval decision. The Contractor shall notify the DOE Regulatory Unit of the intent to submit a partial authorization request, complete with scope and content of the proposed request, not less than six months prior to its submission.

The Contractor may provide the following limited authorization requests:

i. Limited Construction Authorization for site preparation and excavation.
ii. Reserved
iii. Others, as mutually agreed.

The DOE Regulatory Official will establish review guidance for these partial authorization requests in advance of the submission of the request. The review guidance will incorporate existing requirements of the contract but will be tailored to the scope of the work that the Contractor proposes to accomplish.

(k) Except for those differences identified in this Standard, specific requirements for the radiological, nuclear, and process safety deliverables are provided in the documents referenced in paragraph c.2)(b) of this *Standard.*

(l) During Part B, the Regulatory Unit shall develop and provide additional guidance for the preparation and review of documents and activities identified in Table S4-1. The format and content of guidance shall establish the approach and basis that the Regulatory Unit will use to review the Contractor's submittals and to report the results of the reviews. The Authorization for Construction guidance and the Authorization for Production Operations guidance shall be provided to the Contractor no less than nine months prior to the scheduled submission of the Contractor's authorization request. Guidance for Authorization for Deactivation shall be provided prior to final production operations.

Prior to guidance implementation, the Contractor shall certify to the Contracting Officer that the guidance does not adversely impact cost or schedule. Implemented changes that impact cost and/or schedule will be dispositioned under Section H.28, *Uncontrollable Circumstances*.

(m) During Part B, all submitted regulatory information will be handled in accordance with RL/REG-97-05, *Office of Radiological, Nuclear, and Process Safety Regulation for TWRS Privatization Contractors Management Directives,* Directive 2.1, *Information Management*, and, as appropriate, shall be made immediately available to the public by the Regulatory Unit.

Table S4-1. Radiological, Nuclear, and Process Safety Deliverables for Part A and Part B

Regulatory Action	Deliverable[1]	References	Part A Deliverable Status	Part B Deliverable Status		
				Start of Construction	Start of Production Operations	Start of Deactivation
1. Standards Approval	Safety Requirements Document	DOE/RL-96-0003	Final	Revision	Revision	
	Integrated Safety Management Plan	DOE/RL-96-0003, 10 CFR 830,	Final	Revision	Revision	Revision
	Hazards Analysis Report	29 CFR 1910	Final	Revision	Revision	
	Employee Concerns Management System	DOE-STD-3009-94 29 CFR1910.119	Final			
	Radiation Exposure Standard for Workers Under Accident Conditions	DOE Order 5480.29	Final			
	Quality Assurance Program[3]	DOE/RL-96-0006 10 CFR 830.120	Final	Revision	Revision	Revision
2. Initial Safety Evaluation	Initial Safety Assessment	DOE/RL-96-0003	Final			
3. Authorization for Construction	Construction Authorization Request	DOE/RL-96-0003		Final		
	Deactivation Plan	DOE/RL-96-0003	Outline	Revision	Revision	Revision
4. Authorization for Production Operations	Operating Authorization Request	DOE/RL-96-0003		Outline	Final	
	Safety Analysis Report	DOE/RL-96-0003 29 CFR 1910.119	Initial	Preliminary	Final	Revision
	Emergency Response Plan	Note 2	Outline	Draft	Final	Revision
	Unreviewed Safety Question Plan	DOE/RL-96-0003	Outline	Draft	Final	Revision
	Conduct of Operations Plan	DOE/RL-96-0006 & 29 CFR 1910	Outline	Draft	Final	Revision
	Technical Safety Requirements	DOE/RL-96-006	Outline	Draft	Final	Revision
	Training and Qualification Plan	29 CFR 1910 & 40 CFR 68	Outline	Draft	Final	Revision
	Maintenance Implementation Plan	DOE-96-0006 & WAC246-247	Outline	Draft	Final	Revision
	Occurrence Reporting Procedures	96-0006, 29CFR1910, 40CFR68	Outline	Draft	Final	Revision
	Environmental Radiological Protection Program	40 CFR61 & WAC246-247	Outline	Draft	Final	Revision
	Radiation Protection Program	DOE/RL-96-0006	Outline	Revision	Revision	Revision
5. Oversight Process Determination	Operational Assessment Reports	DOE/RL-96-0003	Outline	On-going	On-going	On-going
6. Authorization for Deactivation	Deactivation Safety Assessment	DOE/RL-96-0003		Outline	Draft	Final

	Deactivation Authorization Request	DOE/RL-96-0003			Outline	Final

Notes:
1. In addition to the deliverables listed, supplemental information for each regulatory action shall be submitted as required by DOE/RL-96-0003, *DOE Regulatory Process for Radiological, Nuclear, and Process Safety for TWRS Privatization Contractors.*
2. Shall comply with requirements of 40 CFR 68, 40 CFR 355, DOE/RL-94-02, Revision 1, and 29 CFR 1910.38, and WAC 246-247 (Plan must be consistent with DOE/RU-94-02, Rev. 1, but exposure standards are contained in SRD Vol. II, Section 2.1)
3 An initial Quality Assurance Program that supports performance of Part A activities shall be submitted 45 days after Contract award (based on existing Contractor systems wherever possible); the DOE Regulatory Unit will provide comment within 15 days of submission.

(n) The Contractor shall permit inspection, by duly authorized representatives of the Regulatory Unit, of his records, premises, activities, and of radioactive materials in possession or use related to the Contractor facility, as is necessary to effectuate the responsibilities of the Regulatory Unit. The Contractor shall provide adequate office space, at the processing facility, for the exclusive use of two full-time Regulatory Unit inspection personnel and temporary space for up to four transient Regulatory Unit personnel. The offices shall be convenient to and have full access to the facility, provide both visual and acoustic privacy and be generally commensurate with other offices at the site.

The Contractor shall afford any inspector, identified by the Regulatory Official as likely to inspect the facility, immediate unfettered access, equivalent to the access provided to regular facility employees, following proper identification and compliance with applicable access control measures for security, radiological protection and personal safety.

3) Environmental Protection

(a) The Contractor shall develop and implement an integrated program to provide environmental protection and compliance.

(b) The Contractor shall prepare and submit to the Contracting Officer for review and action as stipulated in the following descriptions, the environmental protection deliverables defined in Table S4-2, *Environmental Protection Deliverables for Part A and Part B* and as follows:

i. Environmental Plan: Detailed plan that identifies the Contractor's structured approach for environmental protection, compliance, and permitting, including: 1) all planned environmental permitting and compliance activities for Part A and Part B; 2) a detailed permitting and compliance schedule linked to the IMP schedule; and 3) environmental monitoring and reporting requirements. The Environmental Plan shall be submitted for DOE review and comment and include identification of where and when DOE action is anticipated or required.

ii. Dangerous Waste Permit Application(s): Prepared as chapter(s) to the *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste*, Permit Number WA 7890008967.

During Part A, the Contractor shall prepare the permit application(s): 1) in accordance with the requirements of WAC 173-303-806, and 2) consistent with the level of technical information required by the Contract for Part A.

During Part B-1, the Contractor shall submit a complete permit application(s) prepared as chapters to the *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Waste*, Permit

Number WA 7890008967, in accordance with the requirements of WAC 173-303-806 for DOE review, comment, concurrence and certification, and subsequent submission by the Contractor to the regulatory authorities.

The permit application(s) shall address dangerous waste management activities to be performed by the Contractor at their TSD unit(s) during Part B-2.

Dangerous Waste Codes are identified in the Double-Shell Tank System Unit Permit Application (DOE/RL-88-21, October 1, 1996). The Contractor facilities shall be permitted such that the facility may manage and treat all waste codes applicable to the Hanford DST system. If, after the start of Part B-1, new waste codes are identified as applicable to the DST System Unit, this will be dispositioned as a change in accordance with the Changes provisions of Section I.

Waste analysis required for acceptance of dangerous waste shall be included in the Contractor's proposed waste analysis plan as part of the Contractor-prepared dangerous waste permit application. The waste analysis plan shall be consistent with the *Products and Secondary Waste Plan* required under Standard 3. The waste analysis plan shall be prepared in accordance with the requirements of WAC 173-303-110, -300 and –806 permit WA 7890008967.

During Part B, the Contractor shall complete revisions to the permit application(s) and obtain final status under the Dangerous Waste Regulations prior to start of production operations. The Contractor may request approval to start construction from the external regulator prior to obtaining final status.

The Contractor shall provide DOE the opportunity, and DOE will participate in developing responses to Notice(s) of Deficiency (NOD) issued by the regulatory agencies. The Contractor shall provide the proposed NOD responses to DOE for review and concurrence. It is understood that NOD comment resolution workshops may be held. DOE shall be provided the opportunity to participate and will participate in such workshops. The schedule for revisions to the permit application, NOD comment, comment resolution, and subsequent activities shall be included in the IMP. Review and comment schedules shall be in accordance with the provisions of Clause H.12, *Environmental Permits and Applications*, and as noted here. The Contractor shall share draft materials with DOE if expedited schedules are instituted.

Table S4-2. Environmental Protection Deliverables for Part A and Part B

Deliverable Description	Reference[1]	Part A Deliverables	Part B Deliverables				
			Part B-1 Deliverables[2]	Start of Construction	Start of Production Operations	During Operations	Start of Deactivation
Environmental Plan	Standard 4	Final	Revision	Revision	Revision	Revision	Revision
Dangerous Waste Permit Application(s)	WAC 173-303-806 and WA 7890008967	Draft	45 days prior to Ecology submittal[3]	Approval for start of construction from Ecology	Final	Revision[3]	Revision
Environmental Report	Section C.3 and 10 CFR 1021	Final	Letter Revision 4/24/00	N/A	Revision 6 months prior	As required to support Contractor activities	Revision 6 months prior
Notice(s) of Construction	WAC 173-400, WAC 173-401, and WAC 246-247		As required to support Contractor activities	As required to support Contractor activities	As required to support Contractor activities	As required to support Contractor activities	As required to support Contractor activities
Other Site Permits			As required to support Contractor activities	As required to support Contractor activities	As required to support Contractor activities	As required to support Contractor activities	As required to support Contractor activities
Prevention of Significant Deterioration (PSD) Analysis	WAC 173-400, WAC 173-401, Clean Air Act Title I Part C		16 months before start of construction				
Risk Assessment Work Plan	WAC 173-303-680		Draft 4 months after ATP with Part B-1 Final with Treatment Facility Dangerous Waste Permit Application				
Screening Level Risk Assessment	EPA April 1994		Preliminary Letter Report on Screening Level Risk Assessment Due 5/24/2000 Initial screen Due 7/24/2000	Final screen 3 months after regulator approval of RAWP			
Approach for IHLW Delisting	RCRA and HWMA and implementing regulations, Specification 1		Draft due 15 months after ATP with Part B-1, Final due 20 months after ATP with Part B-1				
Draft Petitions for Exemption or Exclusion	RCRA and HWMA and implementing regulations, Specification 1, Approach for IHLW Delisting			As required to support Contractor activities and delisting	As required to support Contractor activities and delisting	As required to support Contractor activities and delisting	
Approach to Land Disposal Restriction Compliance for ILAW	RCRA and HWMA and implementing regulations, Specification 2		Draft due 14 months after ATP with Part B-1, Final due 19 months after ATP with Part B-1				

1 References are not all inclusive. Additional requirements may be applicable.

2 Except for the Preliminary Letter Report on the Screening Level Risk Assessment and the Screening Level Risk Assessment deliverables, Part B-1 deliverables are to be submitted as above, but not later than 20 months after the Contractor is authorized to proceed with Part B.

3 The 45 days submittal period allows 2 weeks for DOE review and comment, 2 weeks for Contractor revision and resolution of DOE comments and 2 weeks for Contractor and DOE concurrence and certifications. This expedited schedule requires facilitation and is only applicable to the initial submittal of the Dangerous Waste Permit Application for the Contractor's treatment facility. Prior to formal submittal of the Dangerous Waste Permit Application to DOE for review, the Contractor shall share draft chapters with DOE for review. Changes from the Part A deliverable shall be identified in the draft chapters. These compliance documents may be required to be modified, revised, reissued, or reapplied by regulatory agencies. This shall be the Contractor's responsibility and shall be done in accordance with Clause H.12, *Environmental Permits and Applications*.

Table S4-2, *Environmental Protection Deliverables for Part A and Part B*, identifies the expedited schedule for submittal of the initial Dangerous Waste Permit Application for the Contractor's treatment facility. Expedited schedules will also be necessary for the related NOD response table development and subsequent submittal to the regulatory agencies, as well as the submittal of the revised Dangerous Waste Permit Application which will incorporate the NOD resolution. In order to provide a timely NOD response, the Contractor shall take up to six weeks to develop draft NOD responses, then DOE and the Contractor shall have two weeks for a concurrent review of the draft response table, then four weeks shall be allotted for Contractor and DOE approvals of the final NOD response table to be submitted to the regulatory agencies. Following submittal of the NOD response table to the regulatory agencies, NOD comment resolution workshops will be conducted.

After completion of the NOD comment resolution workshops, the Contractor shall have six weeks to revise the Dangerous Waste Permit Application for the Contractor's treatment facility, then DOE and the Contractor shall have two weeks for a concurrent review of the revised Dangerous Waste Permit Application, followed by two weeks for the Contractor to resolve comments, revise the application accordingly, certify the application and provide it to DOE for their certification. DOE shall then have two weeks to certify the application.

iii. Environmental Report: A report that describes the possible environmental impacts from construction and operation of waste treatment facilities.

The Environmental Report shall describe: 1) all reasonably foreseeable environmental impacts, including site, system and process impacts; 2) site suitability for planned activities; 3) areas to be disturbed; and 4) reasonably foreseeable, direct and indirect impacts on air quality, surface and ground water, human health, physical and biological resources, noise levels, cultural resources, socioeconomics, and land use. If information is incomplete or unavailable, the extent and impact of the missing information shall be described. The Contractor shall designate any information in the report that is business sensitive or proprietary.

The Environmental Report shall include the following information:

Facility Layout - location on the Hanford Site where all the facilities will be located and identification of indigenous plants and/or wildlife and cultural and historic resources that may be disturbed/removed. Examples of details required include footprint of facility, height and color of facilities, location/sizes of parking lots and roads, location and size of construction lay down areas, location and size of excavation stock piles, location of any facilities incidental to plant (power lines, pipelines, road access), location of future facilities to provide an expanded service as identified in this Contract, habitat and wildlife to be temporarily disturbed and removed, and habitat and wildlife to be permanently disturbed and removed.

Process Flow Diagram - A process flow diagram, with material balance.

Personnel Exposure - Routine personnel exposure estimates for radiological and non-radiological workers, the number of persons exposed, and the basis for the estimates.

Staffing Estimates - Total staffing estimate, in person-years, as well as annual breakout information for the construction and operation phases separately.

Hazards Evaluation - A NEPA Hazards Evaluation with the estimated probability of various accidents occurring, anticipated consequences, including quantification of impacts to workers, non-involved workers, and the general public, and corresponding basis. Each major component of the system should be evaluated and primary accidents identified, related probability and annual frequency estimated, and consequences if accidents occur quantified. Key consequences to evaluate are exposure to workers and releases outside the building in excess of applicable standards. The basis for probability/annual frequency estimates and the consequences should be clearly identified.

Secondary Waste Projections - Volume, content, and disposition of secondary wastes.

Resource Requirements - What resources, and how much, will be used to build and operate the system. Resource requirements include things such as quantification of electricity, steel, concrete, raw materials, process chemicals, water and resources identified in the ICDs. Estimates of where these materials will be obtained and how they will be brought to the Contractor's facility.

Earthen Borrow Areas - Identification of quantity of fill required, if any, where it will be obtained, and how it will be transported to the Contractor's facility, including the route, size of trucks, and number of trucks transporting the materials.

Data on Transportation Impacts - Deliveries to facilities, waste pickups, supplies, etc., by truck, rail, or other methods, estimated daily and annually.

Noise Levels - Estimated noise levels and associated impacts during construction.

Environmental Releases - Quantification of releases to the environment (e.g., air emissions and liquid effluents) and descriptions of mitigating design features. Details should include stack heights and maximum and average emission rates.

Summary Level Project Schedule - Identify start/end dates for major construction and operating activities.

Supporting Information - Calculations, references, data, and information to enable DOE to independently verify and evaluate the estimation of environmental impacts.

The Environmental Report, and subsequent revisions, shall be submitted in accordance with Table S4-2, *Environmental Protection Deliverables for Part A and Part B*. The Contractor shall provide any additional environmental and technical information required to establish the environmental impacts of Contractor activities.

iv. Notice(s) of Construction: Notice(s) of Construction (NOCs) shall be prepared by the Contractor for both radioactive and non-radioactive air emissions related to Contractor activities in accordance with applicable regulations. NOCs shall be submitted for DOE review, comment, and concurrence 90 days prior to scheduled submission to the regulators. The Contractor shall also provide draft permit modification language for the air-operating permit based on regulator approvals of NOC and consistent with the project schedule and provisions of this Contract.

v. Other Site Permits: The Contractor shall formally submit, for DOE approval or other action, request(s) for inclusion in any Hanford Site permit other than those in which the Contractor is specifically required to be included under this Contract. The Contractor request shall include the legal, regulatory, and technical basis for Contractor inclusion in the permit, detailed proposal(s) for DOE's administration of the Contractor's participation in the modified permit, and detailed proposals for Contractor participation in the permit modification process. The submittal shall also include: description of covered activities; schedule information and time of coverage; and description of anticipated permit changes. For any such requests, the Contractor shall identify alternatives to its inclusion in such permits in the event that DOE denies the Contractor's request.

In the event of DOE approval of such Contractor request(s), the Contractor shall submit to DOE complete applications for said

permit modifications which are required by, and in accordance with, applicable laws and regulations.

vi. Prevention of Significant Deterioration (PSD) Analysis: During Part B-1, the Contractor shall perform a PSD analysis and issue a PSD Analysis Report. This report shall define the emissions from the Contractor's facilities, compare with the PSD limits, and determine whether a PSD air permit will be required. This report shall be issued for DOE review and comment prior to submittal to regulatory agencies. Any required permits shall be obtained in accordance with the provisions of this contract.

vii. Risk Assessment Work Plan: The Risk Assessment Work Plan (RAWP) shall be the documented outcome of the Contractor's negotiated agreement with regulators to demonstrate that the treatment facility will meet required environmental performance standards for a thermal treatment facility.

The Contractor shall submit a draft RAWP for DOE review and comment in Part B-1. The Contractor shall submit the final RAWP with the Treatment Facility Dangerous Waste Permit Application.

viii. Screening Level Risk Assessment: During Part B-1, the Contractor shall develop a Screening Level Risk Assessment (SLRA). The SLRA defines the emissions from the vitrification units, estimates the pathways and magnitude of human exposure, and estimates the risk from exposure.

Prior to submittal of the initial screening level risk assessment, the contractor shall provide a preliminary letter report on the screening level risk assessment. The preliminary letter report will be a simplified version of the screening level risk assessment. The scope will consist of evaluating impacts from contractor operations to surface soil around the facility/area and surface water (no sediment) in the Columbia River. The preliminary letter report will cover 6 to 7 chemicals (representative of organic, inorganic, and radionuclide emissions) which will account for the total mass; the point of maximum impact by evaluating three locations to determine the worst case conditions; 2 human receptors; 2 ecological receptors; and 2-3 pathways. Outputs will be designed to provide an early indication of human and ecological risk impacts, and to represent the likely worst case.

ix. Approach for IHLW Delisting: During Part B-1, the Contractor shall develop the approach for obtaining an exclusion and/or exemption (delisting) for the removal of the IHLW product from RCRA and HWMA regulation. This approach shall be documented in a report to DOE for review, comment, and/or concurrence. This report shall include, but not be limited to, the following:

i) recommendation on a coordinated DOE and Contractor approach, to obtain an exemption and/or exclusion from both federal and state requirements, including any necessary Contract modifications;

ii) identification and discussion of, and Contractor actions necessary to meet applicable federal or state regulatory requirements which shall be satisfied through Contractor action;

iii) identification and discussion of, and DOE actions necessary to meet applicable federal or state regulatory requirements which shall be satisfied through DOE action;

iv) detailed description of the technical and regulatory approach which the Contractor will implement;

v) report and provide references for the technical basis for this approach, including Contractor data obtained through testing waste samples and surrogate testing during Part A and Part B-1;

vi) identification and discussion of required joint Contractor and DOE action(s) to implement the approach; and

vii) anticipated schedule for key events or actions for the Contractor, DOE, and regulators.

After DOE concurrence, the Contractor shall implement the approach in support of the DOE petition for obtaining an exclusion and/or exemption (delisting) for the removal of the IHLW product from RCRA and HWMA regulation. This approach shall be consistent with the Dangerous Waste Permit Application activities for the Contractor's treatment facility.

x. Draft Petitions for Exemption or Exclusion for IHLW: A set of documents shall be developed by the Contractor for DOE use in petitioning Ecology and EPA to exempt or exclude the IHLW from regulation under HWMA and RCRA, respectively. These documents shall be developed in accordance with the DOE-concurred Approach for IHLW Delisting and applicable law, regulation, and permit. The Contractor shall include in the petitions, DOE-provided information and shall be responsible for establishing a schedule with DOE for when such information is needed. The Contractor shall support DOE in the DOE-led petitions to Ecology and EPA to exempt or exclude the IHLW from regulation under HWMA and RCRA, respectively.

xi. Approach to Land Disposal Restriction Compliance for ILAW: During Part B-1, the Contractor shall develop the approach for demonstrating compliance with the land disposal restrictions for LAW and shall collect characterization data and demonstration-scale treated waste product data to support the compliance demonstration. This approach shall be an integral part of the Contractor's Treatment Facility Dangerous Waste Permit Application for the Contractor's treatment facility.

During Part B facility operations, the Contractor shall implement the approach, including obtaining, reporting, and certifying required

information to DOE that the ILAW product is acceptable for land disposal.

Standard 5: Safeguards and Security Program

The purpose of this *Standard* is to describe the Safeguards and Security (S&S) program requirements in Part A, Part B-1, and Part B-2.

The Contractor shall develop and implement an S&S program to ensure the protection of DOE-owned material.

a. The scope of DOE S&S requirements includes:

   1) Physical protection;
   2) Material control and accountability (MC&A);
   3) Information and personnel security and the Hanford Site access requirements; and
   4) Government property protection.

b. The Contractor's program shall comply with the applicable regulations, DOE Orders, and DOE-provided top-level S&S requirements stipulated in the document titled *Top-Level Safeguards and Security Requirements for TWRS Privatization* (DOE/RL-96-0002). The Contractor shall design the facility in a manner to provide adequate response time for the Hanford Patrol.

   The Contractor shall incorporate design features to comply with requirements to be defined in the DOE performed Vulnerability Assessment (VA).

c. The Contractor shall prepare and submit to DOE for review and concurrence, the S&S deliverables defined in Table S5-1, *Safeguards and Security Deliverables*.

d. During Part B-1, the Contractor shall provide to DOE the Preliminary Facility Design information prepared during the Design Confirmation Stage for DOE review and comment from an S&S standpoint (see Standard 2, *Project Design Development*). The information shall be provided approximately 14 months after Authorization to Proceed with Part B-1. DOE will determine if the level of design information is sufficient for a VA and if so, DOE will perform the VA. If the information at this stage is insufficient to perform a VA, DOE will provide comments indicating additional design information needs necessary for a VA. This information shall be incorporated in the Design Confirmation Stage, to be provided to DOE prior to 20 months after Authorization to Proceed with Part B-1. DOE will then perform the VA.

e. Information exchange for S&S will occur through the Interface IPT.

Table S5-1. Safeguards and Security Deliverables

Deliverable Description	Reference	Part A Deliverables	Part B Deliverables					
			B-1	Start of Construction	Start of Production Operations	During Operations	Start of Deactivation	Contract Closure
Safeguards and Security Program Plan consisting of:								
MC&A Plan	Standard 5 and DOE/RL-96-0002	Outline	Preliminary Draft [1]	Draft	Final	Annual Revision	Revision	
Security Plan	Standard 5 and DOE/RL-96-0002	Outline	Preliminary Draft [1]	Draft	Final	Annual Revision	Revision	
Classified Attachment	Standard 5 and DOE/RL-96-0002	Outline	Preliminary Draft [1]	Draft	Final	Annual Revision	Revision	
Internal Assessment Reports	Standard 5 and DOE/RL-96-0002				Final	Annual	Final	Final
External Assessment Reports	Standard 5 and DOE/RL-96-0002			Submission within 45 days of receipt of DOE/RL external review report.				

1 Contractor will submit (for review and concurrence) the draft MC&A Plan, Security Plan and Classified Attachment 14 months after Authorization to Proceed with Part B-1 work, commensurate with design maturity.

Standard 6: Business and Finance Plan

Summarized below are the requirements for Contractor deliverables to demonstrate to DOE for purposes of its decision making pursuant to Clause H.37, *Part B-1*, that the necessary arrangements, approvals, authorizations, financial models, and all project and financial documentation have been assembled and are sufficient to achieve financial closing and funding of the Project Facility, to the satisfaction of the Contractor (including each of the shareholders thereof); BNFL and its affiliates, all proposed third party lenders, any other equity investors in the Project, and any other participants in the EPC Arrangements and the O&M Arrangements (as respectively defined below):

a. A final Financing Plan outlining the sources and uses of funds for the capital required to complete the final design, construction, start-up and acceptance testing of the Project Facility including timing, form and amounts of: Contractor Equity Commitment (as defined in Clause H.44, *Financing of Facility Construction*); third party equity, if any, Class A Debt and Class B Debt (each as defined in Clause H.44); contingencies and reserves and the disposition of any unused balances, arrangements made or contemplated to be made among shareholders, affiliates of and/or co-participants with Contractor in EPC, O&M or other Contract related Arrangements (as defined in paragraph (c)); Contractor guarantees, letters of credit, performance bonds, and other third party assurances of funding of debt, equity and working capital as contemplated by such plan (collectively, the "Financing Plan"). An initial draft of the Financing Plan shall be provided to DOE for review and comment by the Contractor six months after Authorization to Proceed with Part B-1 and from time to time thereafter as reasonably requested by DOE until Financial Closing, when the elements of the Financing Plan shall be delivered pursuant to clause H.44.a.2). A second draft of the Financial Plan shall be provided to DOE for review and comment nine (9) months after Authorization to Proceed with Part B-1. This draft shall specifically indicate the approaches which the Contractor is considering with respect to Class A Debt and the schedule for developing these approaches including discussions with potential lenders which the Contractor will follow to fulfill its H.44.a.1)(c) obligations with respect to Class A debt.

b. A business and financing schedule ("Business and Financing Schedule") outlining all the major tasks and corresponding parties required to achieve Financial Closing in accordance with the final Financing Plan and subsequent funding of the Project Facility (the "Business and Financing Schedule"). The Business and Financing Schedule shall be consistent with the requirements of the Extension Period schedule developed pursuant to Clause H.37, *Part B-1*. An initial draft of the Business and Financing Schedule shall be provided to DOE by the Contractor at the time of and in accordance with the submission of first revision of the IMP, after Authorization to Proceed with Part B-1, and from time to time thereafter as reasonably requested by DOE until Financial Closing.

c. A description of the EPC Arrangements identifying a Single Entity (which shall not consist solely of the Contractor) and a designated individual responsible for all aspects of EPC performance. The Single Entity shall be responsible for assuring the performance of all EPC tasks and appropriately applying all remedies and any funds received with respect to the exercise thereof, from commencement of Part B-2 through achievement of Facility Commercial Operation, as provided in the EPC Arrangements. A description of the Contractor's specific approach to the structure of the EPC Arrangements including but not limited to the Contract period preceding Facility Commercial Operation shall be provided to DOE for review and comment. This description shall:

    1) Identify and describe the project delivery structure (e.g., single prime design-build contractor with a guaranteed maximum price; multiple prime contractors with a designated prime responsible for overall coordination; use of an agency construction

manager with multiple prime contractors; or construction manager at-risk with subcontractors; etc.), and the prospective entities to be engaged by the Contractor.

2) Identify the responsibilities and functional scope of work of each anticipated prime contractor(s), major subcontractors and suppliers.

3) Identify and provide the prospective contract documents (including but not limited to bid packages, specifications, drawings, and other prospective performance-related information) and administrative procedures to be used by Contractor to implement the EPC Arrangements.

4) Identify the planned management interfaces and financial relationships between and among Contractor and each of the anticipated prime contractor(s), major subcontractors and suppliers (including equity positions).

5) Describe the timeline for soliciting, negotiating, and awarding contracts to the EPC contractors.

6) Include all contracts, agreements and other documents related to the engineering, procurement, construction, startup and testing of the Facility, arrangements for organization and management of the same, and performance and schedule (including mechanical completion and Facility Commercial Operation) guaranties and warranties to be provided directly or indirectly in connection therewith by the Contractor and its affiliates and by any associated project participants and subcontractors (collectively the "EPC Arrangements");

DOE and lender shall have third party beneficiary rights with respect to all remedies under the EPC Arrangements available to the Contractor, the Single Entity referred to in this paragraph c., and British Nuclear Fuels (BNF plc), including but not limited to:

a) performance guarantees,
b) warranties,
c) remedies pursuant to payment or performance bonds,
d) liquidated damages,
e) remedies for actual damages,
f) insurance proceeds,
g) specific performance or,
h) any other remedies for defects, non-conformance or failure to perform.

In the event the Contractor, the Single Entity referred to in this paragraph c., or BNF plc elects not to exercise such rights and remedies, DOE and the lenders may take all appropriate steps to do so. Such remedies or any funds received with respect to the exercise thereof, shall not constitute Contractor's Equity Commitment as defined under Clause H.44.b.1)

d. A complete set of project documents (the "Project Documents") including:

1) EPC Arrangements described in paragraph c. above;

2) Final draft contract strategy and any available draft or final contracts, agreements, documents and other arrangements (whether with affiliates, within the Contractor entity or with third parties) including arrangements for organization and management of Facility operation, maintenance and associated testing and performance warranties related to the performance of such activities by any Project participants and subcontractors (the "O&M Arrangements");

3) All other material subcontracts and purchase orders, including in each case all attachments and appendices as necessary, as defined in the documentation supporting the Facility financing

4) Any performance or other guarantees which any other subcontractors or persons named in paragraph d.(5) below will provide;

5) Identification of all participating Contractor affiliates, subcontractors and other Project participants including a summary of the level of commitment thereof and their potential obligations and liabilities relative to Project completion and performance together with a timeline: (i) for obtaining final, executed agreements with all such entities; (ii) identifying the responsibilities of each of those entities; (iii) delineating all financial arrangements between and among the Contractor and these entities; and (iv) describing the equity investments of each such entity to the Project, and

6) All restrictions, indemnifications or covenants required by the Contractor of any Contractor affiliates, subcontractors and other Project participants. Each Contractor affiliate, Project participant and subcontractor shall provide a set of audited financial statements for the past three years if such financial statements are reasonably available, and if such statements are not reasonably available, other evidence of the financial capability of such person to perform its contractual obligations to the satisfaction of DOE and the Lenders.

Initial drafts of documentation referenced in paragraphs c and d above shall be provided to DOE by Contractor for review and comment sixteen and one half (16 ½ months after Authorization to Proceed with Part B-1 and thereafter as required until the final form prior to Financial Closing. No changes to these documents shall be made without DOE approval.

e. Execution of the EPC Arrangements and O&M Arrangements (as defined above) shall be a condition precedent to Financial Closing and entering into Part B-2 of the Contract.

f. Documentation in final form evidencing the establishment of the Project Company, as defined in Clause H.39, *Contractor Assignment of Contract*, including Project Company organizational structure, performance warrantees and credit support, capitalization structure and other information reasonably requested by DOE in a manner consistent with Clause H.39, *Contractor Assignment of Contract*. An initial draft of such documentation shall be provided to DOE for review and comment by the Contractor nine months after Authorization to Proceed with Part B-1 and periodically thereafter, as reasonably requested by DOE, until in final form prior to Financial Closing.

g. A complete set of financing documents and all attachments and appendices, as necessary, as defined in the documentation supporting the Facility financing, in final draft form (the "Financing Documents") for delivery pursuant to Clause H.44, *Financing of Facility Construction*. An initial draft of such documentation shall be provided to DOE by the Contractor twelve months after Authorization to Proceed with Part B-1 and from time to time thereafter as reasonably requested by DOE until in final form prior to Financial Closing.

h. A project facility financial pro-forma reflective of the Financing Plan, including a statement of sources and uses, project cash flows, profit and loss statements, tax assumptions (Federal, State and local) with respect to the Project, the Contractor's interest therein and the

EPC and O&M Arrangements, construction draw schedule, timing of equity infusions by, and distributions to Project Company shareholders, balance sheets, fees paid to BNFL affiliates, and detailed IRR calculations of equity rates of returns in accordance with a methodology mutually agreed upon by the parties. The Contractor shall provide an initial draft of the financial pro-forma for review and comment between months four and six after Authorization to Proceed with Part B-1 and thereafter from time to time (together with clarification of any material variances from prior alterations) as reasonably requested by DOE, until in final form prior to Financing Closing.

i. Evidence of receipt of all permits and governmental approvals necessary for the construction, start-up and acceptance testing of the facility in a form and on a schedule as required by Lenders and equity investors in order to meet the terms of Financial Closing and release of project funds, shall be submitted to DOE for review and comment.

j. The parties acknowledge that Financial Closing may occur with approval of the parties as provided in this Contract without all permits required for construction and operation of the facility having been obtained. The parties agree that subsequent to Financial Closing:

1) They will use their best efforts to obtain all permits not obtained prior to Financial Closing as promptly as possible subsequent to Financing Closing and in any case as necessary to meet the schedule set forth in Section F, *Deliveries or Performance*, as such schedule may be modified in accordance with the terms of this Contract; and

2) In the event of any apparent conflict between paragraphs i and j, and other sections of this Standard 6 as relates to delivery of permits and approvals, paragraphs i and j shall be deemed to be controlling.

k. Equity Commitments of the Contractor, other Project participants and BNFL affiliates, if any, with respect to Project Facility financing including final draft documentation, such as equity contribution agreements, and any supporting documentation, detailing the terms under which the Contractor, Project participants and BNFL affiliates will obligate and contribute equity into the project, in a manner consistent with Clause H.44, *Financing of Facility Construction* hereof. An initial draft of such Equity Contribution agreements and related documentation shall be provided to DOE by Contractor with the initial draft of the Financing Documents and thereafter from time to time as reasonably requested by DOE prior to Financial Closing (to the extent there is any mutual change in the source, form or substance thereof) until Financial Closing. Thirty (30) days after the execution of a modification memorializing H.45 *Part B-2 Pricing Methodologies* and quarterly thereafter until Financial Closing , Contractor shall deliver to DOE a letter of assurance executed by a senior official of British Nuclear Fuels, plc (BNF, plc) authorized to bind the company confirming that BNF, plc will commit Equity in the amount of between $200 million and $500 million in the event the parties determine to proceed to Part B-2 of the Contract.

l. Third party approvals and authorizations, such as, those of a parent, affiliate or other Project participants, company board of directors, investment committees or as otherwise necessary to allow for the obtaining of funds to finance the Project Facility including, but not limited to, Equity Commitments, performance guarantees and other undertakings as provided for under the Contract. Such final documentation shall be provided to DOE in draft by the Contractor 20 months after Authorization to Proceed with Part B-1, and thereafter as reasonably requested by DOE prior to Financial Closing (to the extent there is any material change in the source, form or substance thereof).

m. Drafts of forms of documentation to be required by project lenders, guarantors, Contractor and its affiliates and DOE during Part B-2 and not already identified above to the extent the preparation thereof is contemplated by this Agreement.

n. Draft waste minimization incentives for ID3, ID5, ID6, ID11, ID14, ID15 and Specification 12 sodium additives, shall be proposed to DOE by the Contractor 14 months after Authorization to Proceed with Part B-1, and subject to review from time to time by the Parties prior to Financial Closing. Final incentives shall be mutually agreed to by the parties as part of the contractual arrangements of Part B-2. A performance incentive for obtaining an exemption or exclusion from RCRA and HWMA regulation for IHLW product, to the extent such an exemption or exclusion is mutually determined to be feasible, shall be mutually agreed upon prior to the beginning of Part B-2.

o. Required project loan commitments from Lenders, consistent with Clause H.44, *Financing of Facility Construction*, shall be provided to DOE by the Contractor twenty months after Authorization to Proceed with Part B-1 and thereafter from time to time as reasonably requested by DOE until in final form prior to Financial Closing.

p. In addition to the foregoing deliverables, Contractor shall comply with the following requirements:

1) At least monthly, Business/Contract/Finance IPT meetings shall be conducted to report progress and resolve problems associated with the financial and pricing deliverables hereinabove contemplated.

2) For each year of the Project, provide an estimate of the required funding by DOE for performance of the Contract and for payment of termination as contemplated in the Contract. This information shall be linked with information developed in Section C Standard 1 c.2)(m) and Section C Standard 1 c.2)(n). Estimates of such termination obligations shall be delivered to DOE by the Contractor with the Project cost estimate for Part B-1 required pursuant to Clause H.2, paragraph b.2 and the Financial Pro Forma required pursuant to paragraph h of this Standard 6 and updated estimates shall be delivered quarterly, thereafter, together with updates of items described in paragraphs a, and b, in a form suitable to support such estimates. BNFL shall submit information such that it provides assurance that there is a clear linkage between the Financial Pro Forma and the amount to be appropriated each fiscal year which shall be established in accordance with total project estimated cost profiles and in conformance with the fixed price established for Part B services.

3) The Contractor shall include a risk management process that includes activities associated with the identification and management of project risks through the: 1) systematic review of project technical requirements, costs, and schedules to identify critical risks and their likelihood of occurrence and consequences; 2) cataloging and tracking of critical risks and handling actions; 3) review of progress in managing risks; and; 4) direct link to contingency determination. Risk workshops shall be held on a not less than quarterly basis.

Standard 7: Fixed-Unit Prices

The purpose of this *Standard* is to describe the requirements for the proposed Part B-2 fixed-unit prices to be submitted as deliverables in Part B-1. The fixed-unit prices shall be based upon and integrated with technical, regulatory, and business and finance work performed under this Contract. The parties agree that the pricing information submitted under this Standard 7 shall reflect the pricing assumptions defined in Section J, Attachment 8, *Part B-2 Pricing Assumptions*. The prices shall be based upon the Contract on the date of price submission. The proposed prices shall not be based upon or contingent upon proposed changes to the Contract. The proposed fixed-unit prices and associated pricing information shall be provided as follows:

a. Fixed-Unit Prices for treatment and immobilization services shall be provided for each Waste Envelope (A, B, C, and D). Fixed-unit prices shall be provided in accordance with Section B.

b. The Contractor shall provide certified cost or pricing data to support the proposed fixed-unit prices for Part B-2. Such data must reconcile to the proposed fixed-unit prices and be comparable in form to Table 15-2 of FAR 15.408. Quantities and pricing rates must be readily discernable for each cost element for each period of price escalation. Indirect costs shall include identification and value of each cost element in the indirect cost pool and identification of the allocation base. Copies of any applicable indirect rate agreements must also be provided.

   Certified cost or pricing data must be provided for all existing and proposed subcontracts in accordance with FAR 52.215-13. The Contractor shall also provide a copy of the subcontract along with the Contractor's cost/price analysis. The Contractor shall ensure that the cost or pricing data provided is also referenced or otherwise traceable to the requirements of Clause H.37 and Standard 7.

c. The Contractor shall provide an explanation as to material changes in the fixed-unit prices from those indicated in the "Enhanced Proposal" submitted as a Part A deliverable and negotiated prior to the commencement of Part B-1. The associated impacts on price should be quantified to the extent feasible.

d. The Contractor shall submit a Cost Accounting Standards Disclosure Statement for the business entity expected to perform the Part B-2 work effective with the application of Cost Accounting Standards to the contract in accordance with FAR 52.230-2.

e. In accordance with Clause H.5, *Economic Price Adjustment*, the Contractor shall submit a cost category breakdown for each fixed-unit rate, an appropriate escalation index, and the period for which the index should be applied. The Contractor may also propose an alternative simplified methodology which essentially accomplishes the same economic adjustment.

f. A cumulative project contingency utilization profile shall be developed. The cumulative project contingency utilization profile shall define total cumulative contingency utilization against time (from the start of Part B-2 through the completion of commercial operations) for all project participants for each major project phase: design/construction; commissioning; operation. The cumulative project contingency utilization profile establishes projected contingency requirements and shall be directly traceable and linked to the following minimum products completed during Part B-1 of the contract: contingency requirements identified in the Project Cost estimate and Supporting Document Package; time-phased contingency uses identified in the schedule presented in the Final Integrated Master Plan; the final risk register; and the cumulative plant performance profile and its supporting analyses.

A draft of the project contingency utilization profile shall be provided to DOE for review no later than 18 months after the start of Part B-1.

Standard 8: Facility Deactivation

The purpose of this *Standard* is to describe the requirements for the *Deactivation Plan* submitted in Part A and to be revised during Part B-1 and Part B-2 and the facility deactivation to be performed in Part B-2. The *Deactivation Plan* shall be revised by the Contractor during Part B-2 to remain consistent with facility conditions and upon reasonable DOE request. Any such revision to the *Deactivation Plan* shall be subject to DOE comment and concurrence. This concurrence is separate from Regulatory Unit approval and authorization. The Contractor shall submit any changes to the *Deactivation Plan* to DOE for concurrence.

The *Deactivation Plan* shall be integrated with all technical, regulatory, and business and finance aspects of this Contract.

a. During Part B-1 and Part B-2, the Contractor shall revise for DOE concurrence the *Deactivation Plan* submitted in Part A consistent with Part B-1 and B-2 technical design, respectively. The revised *Deactivation Plan* shall be submitted to DOE for concurrence. The revised *Deactivation Plan* shall be consistent and integrated with the RCRA Closure Plan. The revised *Deactivation Plan* shall describe how the Contractor-provided facilities and equipment shall be deactivated, and discuss the following topical areas listed below.

1) Facility End-Point Criteria: The *Deactivation Plan* shall define the physical state at the end of facility deactivation, including detailed measurable end-points for the site, facilities, systems/equipment, and documentation. Minimum facility end-point criteria shall include the following:

(a) Remediation of all hazardous and dangerous chemicals and radioactive site contamination that results from Contractor activities.

(b) Removal of inventories of hazardous materials and dangerous waste, and radioactive materials.

(c) Removal and stabilization of residual radioactive source terms to reduce risk to at least a low-hazard facility in accordance with DOE Order 5480.23 and DOE-STD-1027-92. Primary facility and process system requirements include:

i. Specific definition of major process equipment, piping, and deactivated electrical systems to be left in place.

ii. Specific definition of instrument and control systems to be left operational.

iii. Flushing internal surfaces of all process systems to remove water-soluble or transportable chemical and radioactive material.

iv. Decontaminating and cleaning external surfaces of all process equipment to minimize radioactive source terms.

v. Decontaminating and cleaning all internal surfaces of the process facility to minimize radioactive source terms.

vi. Fixing any residual contamination on internal surfaces of the process facility to prevent migration.

vii. Minimizing areas that require radiological or other controls.

viii. Containing residual hazardous materials and dangerous waste and radioactive materials within existing confinement structures.

(d) Removal of all Special Nuclear Material (SNM) to the practical extent possible. The quantity of nuclear materials remaining shall be no greater than Category IV-E levels established in DOE Order 5633.3B.

(e) Leaving in-place all confinement structures with adequate capability to maintain deactivated status; stabilizing other structures to minimize weather intrusion and prevent animal intrusion; and providing safe, controlled access to all structures.

(f) Providing the minimum number of active systems required to maintain deactivated status to accomplish the following:

i. Deactivation, consolidation, or isolation of all facility and process systems to the maximum extent possible while maintaining contamination control.

ii. Removal of all combustible and flammable materials; reduction or elimination of all fire protection, monitoring, and alarm systems to the maximum extent possible.

iii. Elimination or minimization of all utility systems not required to maintain deactivated status.

(g) Removal of separable equipment, materials, and tools for other use or salvage.

(h) Installation of monitoring systems for interim surveillance for use prior to Decontamination and Decommissioning (D&D)/RCRA Closure.

(i) Providing deactivated facility configuration and operations documentation that defines: process and facility configuration; level and location of residual contamination; system capabilities that remain for D&D/RCRA Closure; and operational requirements prior to D&D/RCRA Closure.

2) Final Facility and Site Characterization Survey: The *Deactivation Plan* shall describe:

(a) The method to verify success of remediation for site contamination.

(b) The method to establish location, nature, extent and quantification of residual site contamination.

(c) The method to establish location, nature, extent and quantification of residual facility contamination.

3) Operational and Maintenance Requirements of the Deactivated Facility: The *Deactivation Plan* shall describe the required information to maintain the deactivated facility, including operations and maintenance requirements for active systems, maintenance requirements to assure structural integrity, and procedures necessary to reactivate essential systems for eventual D&D/RCRA closure.

4) Facility Turnover: The *Deactivation Plan* shall describe the methods to verify achievement of end-point criteria, protocols for formal turnover of the facility and site to DOE, and the transfer of facility operating records and other documentation.

b. Upon completion of waste treatment services in Part B, the Contractor shall deactivate Contractor-provided facilities in conformance with the approved *Deactivation Plan*, Interface Description 10, *Deactivated Facility and Site*, and the deactivation authorization provided by the Regulatory Unit.

C.6 Specifications

This section provides specifications for the waste feeds, immobilized waste products and intermediate waste products shown in Figure C-1, *Privatization Functions, Inputs, and Outputs*;

Specification 1: Immobilized High-Level Waste
Specification 2: Immobilized Low-Activity Waste
Specification 3: Entrained Solids
Specification 4: Reserved
Specification 5: Reserved
Specification 6: Reserved
Specification 7: Low-Activity Waste Envelopes Definition
Specification 8: High-Level Waste Envelope Definition
Specification 9: Liquids or Slurries Transferred to DOE by Pipeline
Specification 10: Reserved
Specification 11: Reserved
Specification 12: Number of HLW Canisters per Batch of Waste Envelope D

Specification 1: Immobilized High-Level Waste

1.1 Scope: This *Specification* defines requirements for the *Immobilized High-Level Waste* (IHLW) product, one of the final waste products identified in Section C.4, *Description of Services and Deliverables* of this *Statement of Work*.

The IHLW product for disposal in the proposed geologic repository is a vitrified borosilicate glass waste form.

1.2 Requirements:

1.2.1 References:

1.2.1.1 DOE. May 1998. *Civilian Radioactive Waste Management Systems Requirements Document*, Rev. 4. U.S. Department of Energy, Office of Civilian Radioactive Waste Management, Washington, D.C.

1.2.1.2 DOE Order 5820.2A. September 26, 1988. *Radioactive Waste Management.* U.S. Department of Energy, Washington, D.C.

1.2.1.3 WASRD. DOE/RW-0351P. Rev. 2. DCN 02. December 1996. *Waste Acceptance System Requirements Document (WASRD*). U.S. Department of Energy, Office of Civilian Radioactive Waste Management, Washington, D.C.

1.2.1.4 WAPS. DOE/EM-0093. Rev. 2. December 1996. *Waste Acceptance Product Specifications for Vitrified High Level Waste Forms* (*WAPS*). U.S. Department of Energy, Office of Environmental Management, Washington, D.C.

1.2.1.5 QARD. DOE/RW-0333P. Rev. 8. November 13, 1997. *Quality Assurance Requirements and Description for the Civilian Radioactive Waste Management Program (QARD*). U.S. Department of Energy, Office of Civilian Radioactive Waste Management, Washington, D.C.

1.2.1.6 40 CFR 268. *Land Disposal Restrictions*. Code of Federal Regulations. U.S. Environmental Protection Agency, Washington, D.C.

1.2.1.7 WAC 173-303. *Dangerous Waste Regulations*. Washington Administrative Code, as amended.

1.2.1.8 HWMA. *Hazardous Waste Management Act.*

1.2.1.9 RCRA. *Resource Conservation and Recovery Act*.

1.2.2 Product Requirements:

1.2.2.1 Immobilized High-Level Waste:

1.2.2.1.1 Product and Disposal Requirements: The IHLW product shall meet the requirements in the WASRD, WAPS, and QARD except that the Contractor shall not be required to obtain delisting of the IHLW product. The WASRD is the senior requirements document and defines the minimum set of requirements and associated limits for acceptance of the IHLW product in the proposed geologic repository. The WAPS establishes the minimum set of product requirements for the IHLW product. The QARD establishes the minimum quality assurance requirements for the IHLW product.

1.2.2.1.2 Canister System: The reference canister system used to contain the IHLW product shall be a 4.5-meter long by 0.61-meter diameter canister system with a neck and flange design similar to that used at the West Valley Demonstration Project in New York.

1.2.2.1.3 The WASRD Specification 3.2.3.1.1.3 *HLW Standard Form* shall be modified as follows to incorporate a 4.5-meter long canister system:

1. Total length shall be 4.5 meters (+0.005, -0.020 m).
2. Canister diameter - Not changed.
3. Weight shall not exceed 4200 kilograms.
4. Fill height shall be equivalent to at least 87% of the volume of the empty canister. The average fill height over all the canisters shall be at least 95% of the volume of the empty canister.
5. Total heat generation rate for any single canister shall not exceed 1500 watts per canister at the year of delivery to DOE. The average heat generation rate for all canisters shall not exceed 300 watts per canister.
6. Glass temperature - Not changed.
7. Cover gas leak rate - Not changed.
8. Canister label - Not changed.
9. Plutonium concentration - Not changed.

1.2.2.1.4 The WASRD Specification 3.2.3.1.1.20, *HLW Form Condition at Delivery* shall be modified as follows to incorporate a 4.5-meter long canister system:

At time of delivery to DOE, the HLW form shall stand upright without support on a flat horizontal surface and properly fit into a right-circular, cylindrical cavity (64-cm diameter and 4.51-m length).

1.2.2.1.5 Dangerous and Hazardous Waste Requirements: The IHLW product shall be treated by the Contractor in accordance with RCRA and HWMA and their implementing regulations so that DOE may successfully petition for the IHLW product to be exempted or excluded from regulation as a dangerous or hazardous waste. The Contractor shall perform sampling, analysis, reporting, and certification: 1) necessary to characterize the IHLW product for dangerous waste characteristics, dangerous waste criteria and dangerous waste sources as specified in WAC 173-303-070; 2) necessary to support the petition for exemption or exclusion of the

IHLW product from RCRA and HWMA and their implementing regulations; and 3) as otherwise required under law or regulation. The sampling, preparation and testing methods shall conform to the requirements in WAC 173-303-110.

The Contractor shall designate the IHLW product in accordance with RCRA and HWMA and their implementing regulations. The Contractor shall report and certify the information required: 1) to show that the treated waste in the IHLW product is not prohibited from land disposal pursuant to WAC 173-303-140 and 40 CFR 268, *Land Disposal Restrictions*; 2) for DOE to petition EPA and Ecology for an exemption or exclusion from RCRA and HWMA and their implementing regulations; and 3) to comply with applicable law, regulation, or this Contract.

The Contractor shall prepare a petition(s) for DOE submittal to EPA and Ecology for an exemption or exclusion of IHLW from RCRA and HWMA and their implementing regulations. Standard 4, *Safety Health and Environmental Program*, includes the requirements for preparing these petitions. A detailed description of the Contractor's approach to meeting requirements for preparing the DOE petitions to EPA and Ecology for an exemption or exclusion from RCRA and HWMA for the IHLW shall be provided by the Contractor in the *Products and Secondary Wastes Plan* (described in Standard 3, *Product Qualification Characterization, and Certification*). This description shall include anticipated data required, quality required, certifications, and follow-on technical support to the petition review and approval process.

1.2.2.1.6 Product Loading: Loading of non-volatile components in Envelope D, and, if directed by DOE, entrained solids after washing in accordance with Specification 12, *Number of HLW Canisters Per Batch of Waste Envelope D*, shall be achieved, such that, the concentration of at least one of the waste components or waste component combinations in Table TS-1.1, *Minimum Component Limits in HLW Glass* exceeds its minimum weight percent in HLW glass as identified in Table TS-1.1 (e.g., for a high-iron waste, the Contractor shall incorporate at least 12.5 weight percent iron oxide from the waste into the glass). The product loading shall not cause the limits in any other requirement of this specification to be violated. Product waste loading shall be calculated on an average basis for each batch transfer of Waste Envelope D. The waste loading may be adjusted downward if necessary to comply with Universal Treatment Standards (UTS) leaching requirements.

1.2.3 Handling Requirements:

1.2.3.1 Product Handling: The canister shall have a point of connection that allows vertical upward, vertical downward, and horizontal motion while attached to a hoist and grapple.

1.3 Quality Assurance: The Contractor shall implement a Quality Assurance program for the immobilized high-level waste form development, qualification, characterization, and certification. The QA

program shall be consistent with DOE/RW-0333P and the Contractor's responsibility for producing a product that meets the requirement of the IHLW specification.

1.4 Inspection and Acceptance: The DOE-approved *Products and Secondary Wastes Plan*, described in Standard 3, *Product Qualification, Characterization, and Certification*, defines the content and delivery of Contractor documentation required to demonstrate compliance with the requirements of this specification. Product inspection and acceptance shall be performed in accordance with Section E, *Inspection and Acceptance* and the Contractor's IHLW Quality Assurance program. In addition to Section E, *Inspection and Acceptance*, requirements for IHLW, the Contractor shall conform to the Contractor Certification Program as described in DOE Order 5820.2A, Chapter III, Section 3.E.(4).

Table TS-1.1 Minimum Component Limits in HLW Glass

Component	Weight Percent in HLW Glass
Fe_2O_3	12.5
Al_2O_3	11.0
$Na_2O + K_2O$	15.0
ZrO_2	10.0
UO_2	8.0
CaO	7.0
MgO	5.0
BaO	4.0
CdO	3.0
NiO	3.0
PbO	1.0
TiO_2	1.0
Bi_2O_3	2.0
P_2O_5	3.0
F	1.7
$Al_2O_3 + ZrO_2$	14.0
$Al_2O_3 + ZrO_2 + Fe_2O_3$	21.0
MgO + CaO	8.0
Cr_2O_3	0.5
SO_3	0.5
Ag_2O	0.25
$Rh_2O_3 + Ru_2O_3 + PdO$	0.25
Any single waste oxide (exclusive of Si) not specifically identified in Specification 8, TS-8.1 and 8.4	0.2
Total of all other waste oxides (exclusive of Si) not specifically identified in this table.	8.0
Total of all waste oxides, excluding Na_2O and SiO_2	40.0

Specification 2: Immobilized Low-Activity Waste

2.1 Scope: This *Specification* defines the requirements for the *Immobilized Low-Activity Waste* (ILAW) product, one of the final waste products identified in Section C.4 of this *Statement of Work*. The ILAW product for disposal is a glass waste form.

2.2 Requirements:

2.2.1 References:

2.2.1.1 10 CFR 61. *Licensing Requirements for Land Disposal of Radioactive Waste*, Code of Federal Regulations. U.S. Nuclear Regulatory Commission, Washington, D.C.

2.2.1.2 40 CFR 268. *Land Disposal Restrictions*. Code of Federal Regulations. U.S. Environmental Protection Agency, Washington, D.C.

2.2.1.3 49 CFR 172.101. *Table 2 - Radionuclides*. Code of Federal Regulations. U.S. Department of Transportation, Washington, D.C.

2.2.1.4 49 CFR 173. *Shippers-General Requirements for Shipments and Packaging.* Subpart I - *Radioactive Materials,* Code of Federal Regulations. U.S. Department of Transportation, Washington, D.C.

2.2.1.5 ANSI Standard N14.5. January 16, 1987. *American National Standard for Radioactive Materials - Leakage Tests on Packages for Shipment*. American National Standards Institute, New York.

2.2.1.6 ANSI/ANS-16.1. April 14, 1986. *Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short Term Test Procedure.* American National Standards Institute/American Nuclear Society, La Grange Park, Illinois.

2.2.1.7 ANSI/ANS-55.1. July 28, 1992. *American National Standard for Solid Radioactive Waste Processing System for Light-Water-Cooled Reactor Plants; Appendix B - Testing for Free Liquids in Solidified Matrices*. American National Standards Institute/American Nuclear Society, La Grange Park, Illinois.

2.2.1.8 ASTM B553-79. May 25, 1979. *Standard Test Methods of Electroplated Plastics*. American Society for Testing and Materials, Easton, Maryland.

2.2.1.9 ASTM C39-94. November 15, 1994. *Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens*. American Society for Testing and Materials, Easton, Maryland.

2.2.1.10 ASTM C1285-94. October 15, 1994. *Standard Test Methods for Determining Chemical Durability of Nuclear Waste Glasses: Product Consistency Test (PCT)*. American Society for Testing and Materials, Easton, Maryland.

2.2.1.11 ASTM G21-90. October 26, 1990. *Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi*. American Society for Testing and Materials, Easton, Maryland.

2.2.1.12 ASTM G22-76. November 26, 1976. *Standard Practice for Determining Resistance of Plastics to Bacteria*. American Society for Testing and Materials, Easton, Maryland.

2.2.1.13 DOE Order 5820.2A. September 26, 1988. *Radioactive Waste Management*. U.S. Department of Energy, Washington, D.C.

2.2.1.14 NRC. January 1995. *Branch Technical Position on Concentration Averaging and Encapsulation*. Division of Waste Management, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C.

2.2.1.15 NRC. January 1991. *Technical Position on Waste Form*, Rev. 1, Low-Level Waste. Division Management Branch, Office of Nuclear Material Safety and Safeguards, U. S. Nuclear Regulatory Commission, Washington, D.C.

2.2.1.16 NUREG/BR-0204. April 1995. *Instructions for Completing NRC's Uniform Low-Level Radioactive Waste Manifest*. U.S. Nuclear Regulatory Commission, Washington, D.C.

2.2.1.17 SW-846, *Test Methods for Evaluating Solid Waste*, Physical/Chemical Methods, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

2.2.1.18 WA 7890008967. Rev. 2. August 1995 (as modified). *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage and Disposal of Dangerous Waste*. Hanford Facility, Washington State Department of Ecology, Olympia, Washington.

2.2.1.19 WAC. WAC 173-303. 1995. *Dangerous Waste Regulations*, Washington Administrative Code, as amended.

2.2.1.20 Vitreous State Laboratory, 1998. *Glass Formulation and Testing with TWRS LAW Simulants*, The Catholic University of America, Washington, D.C.

2.2.2 Product Requirements:

2.2.2.1 Package Description: The ILAW product shall be in the form of a package. The constituent parts of each package are a sealed stainless-steel container enclosing a poured glass waste form and an optional filler material of sand or glass. If an optional filler is used, the Contractor shall obtain DOE concurrence on the filler composition.

2.2.2.2 Waste Loading: The loading of waste sodium from Envelope A in the ILAW glass shall be greater than 14 weight percent based on Na_2O. The loading of waste sodium from Envelope B in the ILAW glass shall be greater than 5.0 weight percent based on Na_2O. The loading of waste sodium from Envelope C in the ILAW glass shall be greater than 10 weight percent based on Na_2O.

2.2.2.3 Size and Configuration: The package shall be a stainless-steel right circular cylinder. The as fabricated package dimensions shall be constant and have a dimensional tolerance of +/- 0.01m. The height of the package shall be 2.3 m, and the diameter shall be 1.22 m. At the time of acceptance, the ILAW package shall stand without support on a flat, horizontal surface and shall fit completely and

without forcing when lowered vertically into a right circular cylindrical cavity having internal dimensions of 1.27 m diameter by 2.4 m high.

2.2.2.4 Mass: The mass of each package shall not exceed 10,000 kilograms.

2.2.2.5 Void Space: The void space in the container shall not exceed 10% of the total internal volume at the time of filling, excluding void space internal to the glass waste form (e.g., small bubbles in the glass). After cooling, the container shall be filled with suitable inert dry filler such that the void space shall not exceed 5%.

2.2.2.6 Chemical Composition Documentation: The Contractor shall identify and document the chemical composition of the waste form, filler, and package.

2.2.2.6.1 Chemical Composition Qualification: The Contractor shall identify in the ILAW qualification documentation the expected chemical composition of the waste form, optional filler, and package. The reported composition shall include elements (excluding oxygen) present in concentrations greater than 0.5 percent by weight and elements and compounds required to meet regulatory or Contract requirements.

2.2.2.6.2 Chemical Composition During Production: The Contractor shall report in the ILAW production documentation the chemical composition of each waste form, optional filler, and package. The reported composition shall include elements (excluding oxygen) present in concentrations greater than 0.5 percent by weight and elements and compounds required to meet regulatory or Contract requirements.

2.2.2.6.3 Crystalline Phase Identification: The Contractor shall report in the ILAW qualification documentation the crystalline and non-crystalline phases expected to be present and the estimated amount of each phase for the waste form and filler material. The Contractor shall provide a time-temperature-transformation (TTT) diagram that identifies the duration of exposure at any temperature that causes significant changes in either the phase structure or the phase compositions.

2.2.2.7 Radiological Composition Documentation: The Contractor shall identify and document the radionuclide composition of the waste form. Radionuclides shall be identified that are significant as defined in NUREG/BR-0204 and 49 CFR 172.101 (Table 2). Technetium-99 (^{99}Tc) shall be considered to be significant at concentrations greater than 0.003 Ci/m^3 in the ILAW form. The inventories shall be indexed to December 31, 2002. The documentation shall be consistent with the Radiological Description format described in NUREG/BR-0204.

2.2.2.7.1 Radionuclide Composition Qualification: The Contractor shall identify in the ILAW qualification documentation the estimated radionuclide concentration in the waste form.

2.2.2.7.2 Radionuclide Composition During Production: The Contractor shall report in the ILAW production documentation the radionuclide

inventory in each ILAW package produced. The actual inventory indexed at the month of product transfer and the inventory indexed to December 31, 2002, shall be reported.

2.2.2.8 Radionuclide Concentration Limitations: The radionuclide concentration of the ILAW form shall be less than Class C limits as defined in 10 CFR 61.55 and as described in NRC's *Branch Technical Position on Concentration Averaging and Encapsulation*. In addition, the average concentrations of ^{137}Cesium (^{137}Cs), ^{90}Strontium (^{90}Sr), and ^{99}Tc shall be limited as follows: ^{137}Cs < 3 Ci/m^3, ^{90}Sr < 20 Ci/m^3 and ^{99}Tc < 0.1 Ci/m^3. The average concentrations shall be calculated by summing the actual inventories of each of the above radionuclides in the packages that have been presented to date for acceptance and dividing by the total volume of waste in these packages. The Contractor shall remove on average a minimum of 80% of the ^{99}Tc present in the feed.

2.2.2.9 Surface Dose Rate Limitations: The dose rate at any point on the external surface of the package shall not exceed 1,000 mRem/hr.

2.2.2.10 Surface Contamination Limitations: Removable contamination on the external surfaces of the package shall not exceed 367 Bq/m^2 for alpha and 3670 Bq/m^2 for beta-gamma contamination when measured using the method described in 49 CFR 173.443(a).

2.2.2.11 Labeling: Each package shall have a welded head identification number on the shoulder and side of the package. The lettering on the label shall be at least 5.0 cm high, and characters shall have a width of at least 3.5 cm. The label shall contain a unique identification (e.g., serial number) which shall be assigned to each package and the corresponding documentation. Labels and markings shall have a predicted service life of 50 years assuming that the packages are stored in a ventilated enclosure at ambient temperatures. The label must be readable remotely by an electronic scanner.

2.2.2.12 Closure and Sealing: The fully loaded package shall be closed and sealed by welding. The closure system shall be leak tight as defined by ANSI Standard N14.5. The closure system shall be designed to ensure that the seal remains intact for a storage period of 50 years in an ambient-temperature, ventilated enclosure.

2.2.2.13 External Temperature: The temperature of the accessible external surfaces of the package shall not exceed 50°C when returned to DOE. This temperature constraint shall assume a shaded, still air environment at an ambient temperature of 38°C.

2.2.2.14 Free Liquids: The package shall contain no detectable free liquids as defined in ANSI/ANS-55.1 or SW-846 Method 9095.

2.2.2.15 Pyrophoricity or Explosivity: The package contents shall not be pyrophoric, readily capable of detonation, or readily capable of explosive decomposition or reaction (including reaction with water) at normal pressure and temperature. The waste form and any optional filler materials shall not be ignitable or reactive as defined in WAC 173-303-090(5) and WAC 173-303-090(7).

2.2.2.16 Explosive or Toxic Gases: The package shall not contain or be capable of generating quantities of explosive (e.g., hydrogen) or toxic gases, vapors, or fumes harmful to persons handling the waste.

2.2.2.17 Waste Form Testing:

2.2.2.17.1 Leachability Index: The waste form shall have a sodium leachability index greater than 6.0 when tested for 90 days in deionized water using the ANSI/ANS-16.1 procedure.

2.2.2.17.2 Product Consistency Test (PCT): The normalized mass loss of sodium, silicon, and boron shall be measured using a seven-day PCT run at 90°C as defined in ASTM C1285-98. The test shall be conducted with a glass to water ratio of 1 gram of glass (-100 +200 mesh) per 10 milliliters of water. The normalized mass loss shall be less than 2.0 grams/m^2. Qualification testing shall include glass samples subjected to representative waste form cooling curves. The PCT shall be conducted on waste form samples that are statistically representative of the production glass.

2.2.2.17.3 Vapor Hydration Test (VHT): The glass corrosion rate shall be measured using a seven day VHT run at 200°C as defined in the DOE concurred upon Product and Secondary Waste Plan. The measured glass alteration rate shall be less than 50 grams/(m^2-day). Qualification testing shall include glass samples subjected to representative waste form cooling curves. The VHT shall be conducted on waste form samples that are statistically representative of the production glass.

2.2.2.18 Compressive Strength: The Contractor shall determine the mean compressive strength of the waste form (and any optional filler material) by testing representative non-radioactive samples. The compressive strength shall be at least 3.45E6 Pa when tested in accordance with ASTM C39-94 or an equivalent testing method.

2.2.2.19 Thermal, Radiation, Biodegradation and Immersion Stability: The ILAW product shall be resistant to thermal, radiation, biodegradation and immersion degradation, as described in NRC *Technical Position on Waste Form*. Resistance to each of these types of degradation shall be established by showing that the mean compressive strength of representative non-radioactive samples shall be equal to or greater than 3.45E06 Pa and not less than 75% of the initial compressive strength after subjecting the samples to the following:

2.2.2.19.1 Thermal degradation: 30 thermal cycles between a high of 60°C and a low of -40°C in accordance with the ASTM B553-79 or an equivalent testing method.

2.2.2.19.2 Radiation degradation: Exposure to a minimum radiation dose of 1.0E08 rad or to a dose equivalent to the maximum level of exposure expected from self-irradiation during storage, transportation and disposal if this is greater than 1.0E08 rad.

2.2.2.19.3 Biodegradation: No evidence of culture growth when representative samples are tested in accordance with ASTM G21-90 and ASTM G22-76, or equivalent methods.

2.2.2.19.4 Immersion degradation: Immersion for 90 days under the ANSI/ANS-16.1 testing conditions.

2.2.2.20 Minimization of Glass Waste Form Cracking: The Contractor shall minimize the cracking of the ILAW glass waste form by incorporating features such as graphite coating of the ILAW package interior surfaces and by controlling the cooling rate of the ILAW glass. Methods to minimize cracking shall be identified in the *Products and Secondary Wastes Plan*, and shall be demonstrated on full-scale prototypes. The extent of cracking shall be quantified on full-scale non-radioactive prototypes.

2.2.2.21 Dangerous Waste Limitations: The ILAW product shall be acceptable for land disposal under the State of Washington *Dangerous Waste Regulations*, WAC 173-303, and RCRA LDR in 40 CFR 268. The Contractor shall perform sampling and testing necessary to support designation of the ILAW product for dangerous waste characteristics, dangerous waste criteria and dangerous waste sources as specified in WAC 173-303-070. Information needed to show that the treated waste in the ILAW product is not prohibited from land disposal pursuant to WAC 173-303-140 and 40 CFR 268 shall be provided and certified by the Contractor. Also, information specified in WAC 173-303-072 to pursue an exemption or exclusion from the Dangerous Waste Regulations shall be identified and provided by the Contractor in the ILAW documentation per the *Products and Secondary Wastes Plan*. The sampling, preparation and testing methods shall conform to the requirements in WAC 173-303-110.

2.2.2.22 Compression Testing: Each fully loaded package shall be able to withstand a compression load of 100,000 kg. Compliance with this specification shall be established by using the compression test described in 49 CFR 173.465(d). The Contractor shall demonstrate the integrity of the package by showing that the dimensions of the tested packages are within the tolerance range and by showing that the seal remains intact in accordance with Specification 2.2.2.12, *Closure and Sealing*.

2.2.2.23 Container Material Degradation: The container shall be resistant to degradation by microbial action, moisture, radiation effects, or chemical reactions with the container contents under the expected storage conditions that may reasonably occur during storage (in an ambient-temperature, ventilated enclosure) and handling and disposal operations. The container and handling appurtenances shall be designed to allow safe lifting and movement (in accordance with Specification 2.2.3.1) after a storage period of 50 years. The integrity of the container shall not be jeopardized by wind, blowing sand, precipitation, sunlight, or extreme temperatures (60°C, -40°C).

2.2.2.24 Manifesting: The Contractor shall prepare a shipping manifest for delivery with each shipment of ILAW product. Information on the manifest shall satisfy the requirements in DOE Order 5820.2A, Chapter III, Section 3.d, and NUREG/BR-0204. Any package containing dangerous waste must be labeled and manifested in accordance with WAC 173-303-370 and the *Dangerous Waste Portion of the Resource Conservation and Recovery Act Permit for the Treatment, Storage, and Disposal of Dangerous Wastes* (Permit No. WA 7890008967).

2.2.3 Handling Requirements:

2.2.3.1 Package Handling: The package shall be compatible with crane lifting and movement. The package shall be equipped with lifting and other handling appurtenances designed to allow safe lifting, movement, and stacking of the packages when fully loaded. The package shall maintain its integrity during handling, transportation, and stacking. The package design shall allow for vertical stacking to a total height of 10 meters.

2.3 Quality Assurance: The Contractor shall implement a Quality Assurance program for the immobilized low-activity waste form development, qualification, characterization, and certification. The QA program shall be based upon a nationally recognized standard consistent with the Contractor's responsibility for producing a product that meets the requirement of the ILAW specification. The QA plan shall address the quality assurance/quality control requirements addressed in SW-846 and WAC-173-303-806.

2.4 Inspection and Acceptance: The DOE-approved *Products and Secondary Wastes Plan*, described in Standard 3, *Product Qualification, Characterization, and Certification*, defines the content and delivery of Contractor documentation required to demonstrate compliance with the requirements of this specification. Product inspection and acceptance shall be performed in accordance with Section E, *Inspection and Acceptance* and the Contractor's ILAW Quality Assurance program. In addition to Section E requirements for ILAW, the Contractor shall conform to the Contractor Certification Program as described in DOE Order 5820.2A, Chapter III, Section 3.E.(4).

Specification 3: Entrained Solids

3.1 Scope: This *Specification* defines the requirements for the *Entrained Solids* product, one of the intermediate waste products identified in Section C.4, *Description of Services and Deliverables,* of this *Statement of Work*.

The Contractor is not required to produce an Entrained Solids product under this Contract. The Contractor shall determine the degree of Entrained Solids removal required to comply with the requirements of Specification 2, *Immobilized Low-Activity Waste*.

3.2 Requirements:

3.2.1 References:

3.2.1.1 DOE Order 5820.2A. September 26, 1988. *Radioactive Waste Management.* U.S. Department of Energy, Washington, D.C.

3.2.1.2 WAC 173-303. *Dangerous Waste Regulations*, Washington Administrative Code, as amended.

3.2.2 Product Requirements:

3.2.2.1 Limitation on ^{137}Cs Content: The total quantity of soluble ^{137}Cesium (^{137}Cs) returned to DOE in the Entrained Solids product shall be less than 5% of the total ^{137}Cs provided by DOE in the Low-Activity Waste (LAW) feed.

3.2.2.2 Limitation on ^{99}Tc Content: The total quantity of soluble ^{99}Technetium (^{99}Tc) returned to DOE in the Entrained Solids product shall be less than 5% of the total ^{99}Tc provided by DOE in the LAW feed.

3.2.2.3 Volume Limitation: The Entrained Solids must meet one of the following criteria:

- Greater than 20 volume percent solids;
- Greater than 50% of the solids content at which the slurry viscosity is 30 cP; or
- Greater than 50% of the solids content at which the slurry specific gravity is 1.5.

The preceding criteria represent minimum constraints. Maximum constraints are defined in Specification 9, *Liquids or Slurries Transferred to DOE by Pipeline*.

3.2.2.4 Material Additions: The following materials shall not be added to the Entrained Solids intermediate waste product without advance approval by DOE: sulfur; phosphorous; fluorine; chlorine; chromium; radionuclides; organics; noble metals; iodine; materials that are designated in WAC 173-303 as dangerous waste; and materials excluded by regulatory requirements and permits at the Hanford Site. The Contractor shall not add more than 1 gram of material per kilogram of insoluble solids, measured on a dry basis to the Entrained Solids product. Trace components may be present in chemical reagents used by the Contractor.

3.2.2.5 Sodium Return in Intermediate Waste Products: For the Entrained Solids intermediate waste product, the Contractor shall return less than 60 grams of sodium (excluding the sodium contained in the insoluble Entrained Solids) per kilogram of insoluble solids, measured on a dry solids basis.

3.2.3 Handling Requirements: Entrained Solids separated from the low-activity fraction, if returned to DOE, shall meet the requirements of Specification 9, *Liquids or Slurries Transferred to DOE by Pipeline*.

3.3 Quality Assurance: The Contractor shall implement a QA program for the Entrained Solids development, qualification, characterization, and certification. The QA program shall be based upon a nationally recognized standard consistent with the Contractor's responsibility for producing a product that meets the requirement of the Entrained Solids specification.

3.4 Inspection and Acceptance: The DOE-approved *Products and Secondary Wastes Plan*, described in Standard 3, *Product Qualification, Characterization, and Certification*, defines the content and delivery of Contractor documentation required to demonstrate compliance with the requirements of this specification. Product inspection and acceptance shall be performed in accordance with Section E, *Inspection and Acceptance*, and the Contractor's Entrained Solids QA program. In addition to Section E requirements for Entrained Solids, the Contractor shall conform to the Contractor Certification Program as described in DOE Order 5820.2A, Chapter III, Section 3.E.(4).

Specification 4: Reserved

Specification 5: Reserved

Specification 6: Reserved

Specification 7: Low-Activity Waste Envelopes Definition

7.1 Scope: This *Specification* establishes three waste envelopes for *Low-Activity Waste* (LAW) services, Waste Envelopes A, B, and C; and defines how a unit of low-activity waste is determined for each LAW envelope. Each waste envelope provides the compositional maximums of chemical and radioactive constituents in the waste feed to be treated.

7.2 Requirements:

7.2.1 References:

7.2.1.1 WHC-SD-WM-BIO-001, Rev. E. September 1996, *Tank Waste Remediation System Basis for Interim Operation*. Westinghouse Hanford Company, Richland, Washington.

7.2.1.2 WHC-SD-WM-TSR-006, Revision E. October 1996, *Tank Waste Remediation System Technical Safety Requirements*, Section 5.7, "TWRS Technical Safety Requirements." Westinghouse Hanford Company, Richland, Washington.

7.2.1.3 Code of Federal Regulations, 10 CFR 61 *"Licensing Requirements for Land Disposal of Radioactive Waste*," U.S. Nuclear Regulatory Commission, Washington, D.C.

7.2.1.4 OSD-T-151-00007. Rev. H-16. November 20, 1995. *Operating Specification for 241-AN, AP, AW, AY, AZ, and SY Tank Farms*. Westinghouse Hanford Company, Richland, Washington.

7.2.2 Envelope Requirements

7.2.2.1 Composition: This specification lists the concentration limits for the LAW Envelopes A, B, and C feed to be transferred by DOE to the Contractor for LAW services in Tables TS-7.1, *LAW Chemical Composition, Soluble Fraction Only*, and TS-7.2, *LAW Radionuclide Content, Soluble Fraction Only*. The concentration limits apply to the soluble fraction only. The Na concentration limits for the LAW feeds are identified below.

Waste Feed	Na (mole, liter)
Envelope A, B, C	4 – 10
AZ-101 and AZ-102 Supernatent	2 – 5
HLW Slurry and other HLW Liquids (Defined in Specification 8, *High-Level Waste Envelope Definition*	0.1 – 10

The LAW feeds will contain up to 2 weight percent solids. Solids are defined as the product of centrifuging the LAW feed, separating and drying the solids, and removing the dissolved solids contribution. The insoluble fraction characterization will include measurements of Al, Cr, Fe, Mn, Na, P, S, Si, U, TIC, TOC, ^{60}Co, ^{90}Sr, Tc^{99}, ^{137}Cs, ^{154}Eu, ^{155}Eu, Pu$^{239/240}$, Am241, and total alpha concentrations. Trace quantities of unspecified radionuclides, chemicals, and other impurities may be present in the waste feed.

All feed (soluble and insoluble components) will meet the Tank Farm Operations specifications given in OSD-T-151-00007 (except for free hydroxide), the Tank Waste Remediation System Basis of Interim Operation (BIO) (WHC-SD-WM-BIO-001), and Technical Safety Requirements (WHC-SD-WM-TSR-006 Rev. E).

The radiochemical inventory of the waste feed at the time of delivery shall be compared to the specification limits to assess compliance. The specifications for ^{60}Co, ^{154}Eu and ^{155}Eu shall apply at the time of delivery for ILAW immobilization.

7.2.2.2 The feed provided to the Contractor shall not contain a visible separate organic phase.

7.2.2.3 The waste provided to the Contractor will generate gases, including hydrogen and ammonia, at a nearly constant rate and a nearly uniform composition. The Contractor is responsible for the management of changes in gas release rate and distribution resulting from their waste processing activities.

7.2.2.4 Radioactive Material Concentration: The maximum ^{137}Cs concentration equivalent in the transferred Envelope A, Envelope B and Envelope C wastes feeds shall not exceed 1.2 Ci/l. The maximum ^{137}Cs concentration equivalent in the liquid fraction of tank AZ-101 and AZ-102 feeds shall not exceed 3.0 Ci/l.

7.2.2.5 Dangerous waste codes are identified in the DST System Unit Permit Application (DOE/RL-88-21, October 1, 1996). Multi-source leachate (F039) is included as a waste derived from non-specific source wastes F001 through F005.

7.2.2.6 The Contractor shall obtain the necessary permits, licenses, and other such regulatory approvals for treating the DOE provided wastes, specified within Envelopes A, B, C, and D, within the Contractor's facilities, in accordance with the requirements of Standard 4, *Safety, Health and Environmental Program* and Clause H.12, *Environmental Permits and Applications*. The DOE will review, concur as appropriate, and sign regulatory permits as required by Clause H.12, *Environmental Permits and Applications.*

The regulatory permits for the Contractor's facilities may impose requirements, limitations, or other conditions on the Contractor's facilities. The Contractor shall ensure that the permits, licenses, and other such regulatory approvals allow acceptance and treatment of the waste specified in Envelopes A, B, C, and D.

In the event that trace constituents, not previously identified through past characterization of Hanford tank waste and/or process testing, are discovered in the waste feed after start of Part B-1 result in a material effect on cost or schedule to meet permit requirements, this will be dispositioned in accordance with Section I Changes clause.

7.2.2.7 The Contractor shall be responsible for characterizing the Low-Activity Waste Feed. The characterization will be based on the available historical data obtained from DOE and/or its other contractors and analysis of DOE-provided splits of representative samples of the waste feed to comply with regulatory, safety authorization basis and technical requirements for the operation of the waste receiving and waste treatment facilities. The Contractor shall perform analyses of

the Low-Activity Waste feed based on the analytes listed in the applicable DQO as established with the appropriate regulatory authority.

7.2.3 Units of Low-Activity Waste: Units of Low-Activity Waste shall be defined as follows:

(a) Envelope A: The quantity of Waste Envelope A containing one metric ton of waste sodium shall equal one unit.

(b) Envelope B: The quantity of Waste Envelope B containing one metric ton of waste sodium shall be the lesser of the following number of units:

i. 2.6 units or;

ii. $\frac{X}{Y}$ units

where X is equal to 20 weight percent sodium oxide loading in the ILAW glass and Y is equal to the achievable waste sodium oxide loading, for the particular waste feed. The waste loading limitations shall be based solely upon effects of chlorine, chromium, phosphate, and sulfate.

(c) Envelope C: The quantity of Waste Envelope C containing one metric ton of waste sodium shall be the lesser of the following number of units:

i. 1.15 units or;

ii. $\frac{X}{Y}$ units

where X and Y are defined above. The waste loading limitations shall be based solely upon sodium additions required for cesium, technetium, strontium and TRU removal from Envelope C for the particular waste feed.

Table TS-7.1 LAW Chemical Composition, Soluble Fraction Only

Chemical Analyte	Maximum Ratio, analyte (mole) to sodium (mole)		
	Envelope A	Envelope B	Envelope C
Al	2.5E-01	2.5E-01	2.5E-01
Ba	1.0E-04	1.0E-04	1.0E-04
Ca	4.0E-02	4.0E-02	4.0E-02
Cd	4.0E-03	4.0E-03	4.0E-03
Cl	3.7E-02	8.9E-02	3.7E-02
Cr	6.9E-03	2.0E-02	6.9E-03
F	9.1E-02	2.0E-01	9.1E-02
Fe	1.0E-02	1.0E-02	1.0E-02
Hg	1.4E-05	1.4E-05	1.4E-05
K	1.8E-01	1.8E-01	1.8E-01
La	8.3E-05	8.3E-05	8.3E-05
Ni	3.0E-03	3.0E-03	3.0E-03
NO_2	3.8E-01	3.8E-01	3.8E-01
NO_3	8.0E-01	8.0E-01	8.0E-01
Pb	6.8E-04	6.8E-04	6.8E-04
PO_4	3.8E-02	1.3E-01	3.8E-02
SO_4	1.0E-02	7.0E-02	2.0E-02
TIC[1]	3.0E-01	3.0E-01	3.0E-01
TOC[2]	5.0E-01	5.0E-01	5.0E-01
U	1.2E-03	1.2E-03	1.2E-03

Notes:
1 Mole of inorganic carbon atoms/mole sodium
2 Mole of organic carbon atoms/mole sodium

Table TS-7.2 LAW Radionuclide Content[1], Soluble Fraction Only

Radionuclide	Maximum Ratio, radionuclide (Bq) to sodium (mole)		
	Envelope A	**Envelope B**	**Envelope C**
TRU[2]	4.8E+05	4.8E+05	3.0E+06
^{137}Cs	4.3E+09	2.0E+10	4.3E+09
^{90}Sr	4.4E+07	4.4E+07	8.0E+08
^{99}Tc	7.1E+06	7.1E+06	7.1E+06
^{60}Co	6.1E+04	6.1E+04	3.7E+05
^{154}Eu plus ^{155}Eu	1.2E+06	1.2E+06	4.3E+06

Notes:
1 The activity limit shall apply to the feed certification date.
2 TRU is defined as: Alpha-emitting radioncludes with an atomic number greater than 92 with half life greater than 10 years.

Some radionuclides, such as ^{90}Sr and ^{137}Cs, have daughters with relatively short half-lives. These daughters have not been listed in this table. However, they are present in concentrations associated with the normal decay chains of the radionuclides.

Specification 8: High-Level Waste Envelope Definition

8.1 Scope: This *Specification* establishes the slurry composition for HLW treatment services and the unwashed solids composition (Envelope D). This waste envelope provides the compositional limits for chemical and radioactive constituents and physical properties in the waste feed to be treated.

8.2 Requirements:

8.2.1 References:

8.2.1.1 DOE/RL-88-21. 1996. *Double-Shell Tank System Unit Permit Application.* U.S. Department of Energy, Richland Operations Office, Richland, WA.

8.2.1.2 WHC-SD-WM-BIO-001, Rev. E. September 1996, *Tank Waste Remediation System Basis for Interim Operation*. Westinghouse Hanford Company, Richland, Washington.

8.2.1.3 WHC-SD-WM-TSR-006, Revision E. October 1996, *Tank Waste Remediation System Technical Safety Requirements*, Section 5.7, "TWRS Technical Safety Requirements." Westinghouse Hanford Company, Richland, Washington.

8.2.1.4 OSD-T-151-00007, Rev. H-16, November 20, 1995. *Operating Specification for 241-AN, AP, AW, AY, AZ, and SY Tank Farms*. Westinghouse Hanford Company, Richland, Washington.

8.2.2 HLW Slurry Description and Envelope Requirements

8.2.2.1 Composition: The HLW slurry will contain a mixture of liquids (Envelopes A, B, or C) and solids (Envelope D). The compositional range of the liquid fraction is defined in Specification 7, *Low-Activity Waste Envelopes Definition*. Specification 7.2.2.4 *Radioactive Material Concentration* does not apply to these Envelope A, B or C liquids. The composition range of the Envelope D unwashed solids is given in Tables TS-8.1, TS-8.2, TS-8.3 and TS-8.4. The feed concentration will be between 10 and 200 grams of unwashed solids/liter, except for feeds from waste tanks AZ-101 and AZ-102, where minimum solids content does not apply.

Compositions for Envelope D unwashed solids (Tables TS-8.1, TS-8.2, TS-8.3 and TS-8.4) are defined in terms of elemental or anion concentrations and radionuclide activities per 100 grams equivalent non-volatile waste oxides. The non-volatile waste oxides include sodium oxide and silicon oxide.

The feed components identified in Tables TS-8.1, TS-8.2 and TS-8.3 are waste components important to establishing the waste oxide loading in the HLW glass. Only these components have concentration limits which will be used to provide the basis for certification that the HLW feed is within specification limits.

The feed components identified in Table TS-8.4 are also important to HLW glass production. The concentrations of these components in the waste are not expected to be exceeded. Information on these components will be provided to support product and process qualification but will not be used as a basis for determining if the feed meets specification requirements.

All feed (soluble and insoluble components) will meet the Tank Farm Operations specifications given in OSD-T-151-00007 (except for free hydroxide), the Tank Waste Remediation System Basis of Interim Operation (BIO) (WHC-SD-WM-BIO-001), and Technical Safety Requirements (WHC-SD-WM-TSR-006 Rev. E). The radiochemical inventory of the waste feed at the time of delivery shall be compared to the specification limits to assess compliance.

All feed transferred prior to December 31, 2002, shall be compared to this specification after radiochemical activities are decayed to December 31, 2002. All feeds transferred on December 31, 2002, and thereafter shall be compared directly to the specifications without correction for decay. Trace quantities of unspecified radionuclides, chemicals and other impurities may be present in the waste feed. Feed will be delivered to the Contractor by pipeline in batches. Limits apply to individual batches. Some elements, components, and isotopes are determined by calculation and not analytic measurement.

8.2.2.2 The feed provided to the Contractor shall not contain a visible separate organic layer.

8.2.2.3 The waste provided to the Contractor will generate gases due to radiolysis including hydrogen and ammonia at a nearly constant rate and nearly uniform composition. The Contractor is responsible for the management of changes in gas release rate and distribution resulting from their waste processing activities.

8.2.2.4 Applicable dangerous waste codes are identified in the DST System Unit Permit Application (DOE/RL-88-21, October 1, 1996). Multi-source leachate (F039) is included as a waste derived from non-specific source wastes F001 through F005.

8.2.2.5 Environmental Permitting: The Contractor shall obtain the necessary permits, licenses, and other such regulatory approvals for treating the DOE provided wastes, specified within Envelopes A, B, C, and D, within the Contractor's facilities, in accordance with the requirements of Standard 4, *Safety, Health and Environmental Program* and Clause H.12, *Environmental Permits and Applications*. The DOE will review, concur as appropriate, and sign regulatory permits as required by Clause H.12, *Environmental Permits and Applications.*

The regulatory permits for the Contractor's facilities may impose requirements, limitations, or other conditions on the Contractor's facilities. The Contractor shall ensure that the permits, licenses, and other such regulatory approvals allow acceptance and treatment of the waste specified in Envelopes A, B, C, and D.

In the event that trace constituents, not previously identified through past characterization of Hanford tank waste and/or process testing, are discovered in the waste feed after start of Part B-1 result in a material effect on cost or schedule to meet permit requirements, this will be dispositioned in accordance with Section I Changes clause.

8.2.2.6 The Contractor shall be responsible for characterizing the High-Level Waste Feed. This characterization will be based on the available historical data obtained from DOE and/or its other contractors and analysis of DOE-provided splits of representative samples of the waste feed to comply with regulatory, safety authorization basis, and technical requirements for the operation of the waste receiving and waste treatment facilities. The Contractor shall perform analyses of the High-Level Waste feed based on the analytes listed in the applicable DQO as established with the appropriate regulatory authority.

Table TS-8.1 High-Level Waste Feed Unwashed Solids Maximum Non-Volatile Component Composition (grams per 100 grams non-volatile waste oxides)

Non-Volatile Element	Maximum (grams / 100 grams waste oxides)	Non-Volatile Element	Maximum (grams / 100 grams waste oxides)
As	0.16	Pu	0.054
B	1.3	Rb	0.19
Be	0.065	Sb	0.84
Ce	0.81	Se	0.52
Co	0.45	Sr	0.52
Cs	0.58	Ta	0.03
Cu	0.48	Tc	0.26
Hg	0.1	Te	0.13
La	2.6	Th	0.52
Li	0.14	Tl	0.45
Mn	6.5	V	0.032
Mo	0.65	W	0.24
Nd	1.7	Y	0.16
Pr	0.35	Zn	0.42

Table TS-8.2 High-Level Waste Feed Unwashed Solids Maximum Volatile Component Composition (grams per 100 grams non-volatile waste oxides)

Volatile Components	Maximum (grams / 100 grams waste oxides)
Cl	0.33
CO_3^{-2}	30
NO_2	36 (total NO_2/NO_3) as NO_3
NO_3	
TOC	11
CN	1.6
NH_3	1.6

Table TS-8.3 High-Level Waste Feed Unwashed Solids Maximum Radionuclide Composition (Curies per 100 grams non-volatile waste oxides)

Isotope	Maximum (Ci / 100 grams waste oxides)	Isotope	Maximum (Ci / 100 grams waste oxides)	Isotope	Maximum (Ci / 100 grams waste oxides)
^{3}H	6.5E-05	^{129}I	2.9E-07	^{237}Np	7.4E-05
^{14}C	6.5E-06	^{137}Cs	1.5E00	^{238}Pu	3.5E-04
^{60}Co	1E-02	^{152}Eu	4.8E-04	^{239}Pu	3.1E-03
^{90}Sr	1E+01	^{154}Eu	5.2E-02	^{241}Pu	2.2E-02
^{99}Tc	1.5E-02	^{155}Eu	2.9E-02	^{241}Am	9.0E-02
^{125}Sb	3.2E-02	^{233}U	9.0E-07	$^{243+244}Cm$	3.0E-03
^{126}Sn	1.5E-04	^{235}U	2.5E-07		

Table TS-8.4 Additional High-Level Waste Feed Unwashed Composition for Non-Volatile Components (grams per 100 grams non-volatile waste oxides)

Non-Volatile Element	Maximum (grams / 100 grams waste oxides)	Non-Volatile Element	Maximum (grams / 100 grams waste oxides)
Ag	0.55	Ni	2.4
Al	14	P	1.7
Ba	4.5	Pb	1.1
Bi	2.8	Pd	0.13
Ca	7.1	Rh	0.13
Cd	4.5	Ru	0.35
Cr	0.68	S	0.65
F	3.5	Si	19
Fe	29	Ti	1.3
K	1.3	U	14
Mg	2.1	Zr	15
Na	19		

Specification 9: Liquids or Slurries Transferred to DOE by Pipeline

9.1 Scope: This *Specification* defines the requirements for the return of entrained solids and pretreated low-activity waste.

9.2 Requirements:

9.2.1 References:

9.2.1.1 Greenburg, A.E., L.S. Clesceri, and A.D. Eaton, eds. *Standard Methods for the Examination of Water and Wastewater*. 18th edition, McGraw-Hill, New York.

9.2.1.2 OSD-T-151-00007. Rev. H-16. November 20, 1995. *Operating Specification for 241-AN, AP, AW, AY, AZ, and SY Tank Farms*. Westinghouse Hanford Company, Richland, Washington.

9.2.1.3 HNF-SD-WM-EV-053, Rev. 5.0, *Double-Shell Tank System Waste Analysis Plan*. December 1997, Fluor Daniel Hanford, Inc., Richland, Washington.

9.2.2 Product Requirements:

9.2.2.1 Product Composition: The elemental composition of the product shall be provided: 1) for all elements (excluding oxygen) constituting more than 0.5 wt% (percent by weight) of the product on a dry basis; 2) for all radionuclides present in concentrations greater than 5% of the total activity; and 3) for all elements and compounds required to meet regulatory or Contract requirements.

9.2.2.2 Composition Limits: The composition of the product shall be within the composition limits specified in OSD-T-151-00007 (assumed at a storage temperature of 100°C) and comply with HNF-SD-WM-EV-053.

9.2.2.3 Criticality: The plutonium concentration in the returned material shall meet the requirements of HNF-SD-WM-EV-053. The isotopic concentration of the fissile materials in the returned product shall be provided to DOE prior to transfer.

9.2.2.4 Storage: A visible separate organic phase shall not develop during prolonged storage of the product materials in the DST system.

9.2.2.5 Heat Generation: The Contractor shall determine and report the heat generation rate for product in the *Products and Secondary Wastes Plan*.

9.2.2.6 Physical Parameters: The Contractor shall determine and report the specific gravity, viscosity, solids content, particle size distribution and particle density, pH, and temperature of the product at the time of transfer to DOE. Procedure 2450F, *Settled Solids*, from *Standard Methods for the Examination of Water and Wastewater*, or an equivalent methodology shall be used to determine the volume of solids in the liquid or slurry.

9.2.2.7 Transport Properties: DOE will establish transport properties including transfer rate based upon specific physical and rheological characteristics of the waste stream being transported back to DOE. These requirements will be documented in the appropriate Interface Control Document.

9.2.2.8 Radioactive Material Concentration: The returned intermediate product shall not contain more than 6 curies per liter equivalent of ^{137}Cs. The Contractor shall dilute the returned product, if necessary, to achieve this concentration limit.

9.2.2.9 Prevention of Exothermic Reaction: The returned intermediate product shall not have the potential for an exothermic reaction.

9.2.3 Handling Requirements: None

9.3 Inspection and Acceptance: The DOE-approved *Products and Secondary Wastes Plan*, described in Standard 3, *Product Qualification, Characterization, and Certification,* defines the content and delivery of Contractor documentation required to demonstrate compliance with the requirements of this specification. Product inspection and acceptance shall be performed in accordance with Section E, *Inspection and Acceptance.*

Specification 10: Reserved

Specification 11: Reserved

Specification 12: Number of HLW Canisters Per Batch of Waste Envelope D

12.1 Scope: This *Specification* defines the procedure for determining the number of HLW canisters that will be accepted for each batch of HLW feed delivered per Specification 8, *High-Level Waste Envelope Definition* analysis and reporting requirements for the separated HLW supernatant and, at DOE's option, for the separated Entrained Solids contained within the LAW feed delivered per Specification 7, *Low-Activity Waste Envelopes Definition*. This procedure shall be implemented by the Contractor once per HLW feed source tank after receipt by the Contractor.

12.2 Requirements

12.2.1 References: None.

12.2.2 Determination of Aqueous Insoluble Fraction: For a HLW feed batch, the Contractor shall determine the mass and composition of aqueous insoluble solids present.

12.2.2.1 Representative Sample: The Contractor shall obtain a representative sample of the HLW feed slurry containing at least 100 grams of solids. The Contractor shall displace the interstitial liquids through a series of three washes using 0.01 M NaOH at a temperature of at least 25°C followed by filtration or centrifugation. Each wash shall use a wish volume at least three times the slurry volume.

12.2.2.2 Mass and Composition of Aqueous Insoluble Solids: The Contractor shall determine the mass and composition of aqueous insoluble solids present in the representative sample as follows:

a) The solids shall be separated from the HLW feed slurry by centrifugation at ambient temperature.

b) The solids shall be contacted with 0.01M NaOH solution for a minimum of eight hours at 80°C to 90°C and ambient pressure. The volume of 0.01M NaOH solution shall be at least four times the volume of the centrifuged filtered solids. The solids and water shall be gently stirred to promote dissolution of soluble components.

c) The solids shall be separated from the contact solution by centrifugation at a temperature of 80-90°C.

d) Steps b) and c) shall be repeated two more times for a total of three contacts.

e) The solids remaining after the three batch contacts with 0.01M NaOH solution shall be analyzed to determine the mass of aqueous insoluble solids and the concentration of elements and radionuclides identified in Specification 8, *High-Level Waste Envelope Definition*.

f) The above tests shall not be conducted under saturated conditions for sodium, phosphate, and sulfate.

g) For aqueous washing, the Contractor shall not add more than 4 grams of sodium per kilogram of insoluble solids received in the HLW slurry without approval from DOE.

12.2.3 Determination of Caustic Insoluble Fraction: For a HLW feed batch, the Contractor shall determine the mass and composition of caustic insoluble solids present.

12.2.3.1 Representative Sample: The Contractor shall obtain a representative sample of the HLW feed slurry containing at least 100 grams of solids. The Contractor shall displace the interstitial liquids through a series of three washes using 0.01 M NaOH at a temperature of at least 25°C followed by filtration or centrifugation. Each wash shall use a wash volume at least three times the slurry volume.

12.2.3.2 Mass and Composition of Caustic Insoluble Solids: The Contractor shall determine the mass and composition of caustic insoluble solids present in the representative sample as follows:

a) The solids shall be separated from the HLW feed slurry by centrifugation at ambient temperature.

b) The solids shall be contacted with 3M NaOH solution for a minimum of eight hours at 80°C to 90°C and ambient pressure. The volume of caustic solution shall be at least three times the volume of the centrifuged solids. The solids and caustic solution shall be gently stirred to promote dissolution of caustic soluble components.

c) The solids shall be separated from the contact solution by centrifugation at ambient temperature.

d) The caustic-contacted solids shall be contacted with 0.01M NaOH solution for a minimum of eight hours at 80°C to 90°C and ambient pressure. The volume of 0.01M NaOH solution shall be at least four times the volume of the centrifuged solids. The solids and water shall be gently stirred to promote dissolution of soluble components.

e) The solids shall be separated from the contact solution by centrifugation at ambient temperature.

f) The solids shall be contacted a second time with 0.01M NaOH solution for a minimum of eight hours at 80°C to 90°C and ambient pressure. The volume of 0.01M NaOH solution shall be at least four times the volume of the centrifuged solids. The solids and water shall be gently stirred to promote dissolution of soluble components.

g) The solids shall be separated from the contact solution by centrifugation at a temperature of 80-90°C.

h) The solids remaining after the single batch contact with caustic solution and two batch contacts with 0.01M NaOH solution shall be analyzed to determine the mass of caustic insoluble solids and the concentration of elements and radionuclides identified in Specification 8, *High-Level Waste Envelope Definition*.

i) The above tests shall not be conducted under saturated conditions for sodium, phosphate, and sulfate.

j) For caustic washing, the Contractor shall not add more than 360 grams of sodium per kilogram of insoluble solids received in the HLW slurry without approval from DOE.

12.2.4 Estimated Number of HLW Canisters from Aqueous Insoluble Solids: The expected number of HLW canisters from aqueous-washed solids shall be determined using: 1) IHLW glass component limits provided in Specification 1, *Immobilized High-Level Waste*, Table TS-1.1; 2) 95% canister fill height in accordance with Specification 1.2.2.1.3; and 3) mass and composition of the aqueous insoluble solids determined in Specification 12.2.2. These estimates shall also include the volume of ILAW to be produced in accordance with Specification 2, *Immobilized Low-Activity Waste*, from the immobilization of the solutions resulting from the sludge treatment process.

12.2.5 Estimated Number of HLW Canisters from Caustic Insoluble Solids: The expected number of HLW canisters from caustic -washed solids shall be determined using: 1) IHLW glass component limits provided in Specification 1, *Immobilized High-Level Waste*, Table TS-1.1; 2) 95% canister fill height in accordance with Specification 1.2.2.1.3; and 3) mass and composition of the aqueous insoluble solids determined in Specification 12.2.2. These estimates shall also include the volume of ILAW to be produced in accordance with Specification 2, *Immobilized Low-Activity Waste*, from the immobilization of the solutions resulting from the sludge treatment process.

12.2.6 Specification of Number of HLW Canisters per Batch of HLW: The Contractor shall provide estimates, including experimental and calculational data, of the expected number of HLW canisters (and volume of ILAW) resulting from aqueous washing of the sludge as determined by the requirements of Specification 12.2.4, and caustic washing as determined by the requirements of Specification 12.2.5. DOE will determine the sludge treatment method (aqueous-washing or caustic-washing) and inform the Contractor. This decision shall be the sole discretion of DOE and shall not result in a change or equitable adjustment to the Contract. In the event that washing of HLW feed results in material that would require modification of the Contractor's safety authorization basis, the Contractor shall provide for DOE's concurrence on alternative HLW pretreatment approach.

12.2.7 Adjustment to Sodium Content of LAW Fraction: The quantity of LAW feed treated will be adjusted to account for the liquid fraction of the HLW feed per Specification 8, *High Level Waste Envelope Definition*, sodium removed during HLW pretreatment and the sodium hydroxide solution used to treat the HLW feed.

12.2.8 Determination of HLW Supernatant Mass and Composition: The Contractor shall determine the mass and composition of the HLW supernatant generated from HLW pretreatment.

12.2.8.1 Mass and Composition of HLW Supernatant: The contractor shall determine the mass and composition, by analysis, of the HLW Supernatant generated in Pretreatment Plant Operations, which includes the original filtered HLW supernatant and water or caustic leach solutions generated from HLW pretreatment. The chemical and radiochemical composition shall be reported in accordance with the analytes identified in Table TS 7.1 and Table TS 7.2 of Specification 7, *Low-Activity Waste Envelopes Definition*. DOE will determine the Low-Activity Waste Envelope Designation based upon this analysis.

12.2.8.2 Sodium Added to HLW Supernatant: The Contractor shall add no more than 70 grams of sodium per kilogram of soluble sodium received in the HLW Feed Envelope. This does not include sodium added for HLW pretreatment described in 12.2.2 or 12.2.3, or sodium leached from the HLW solids.

12.3 Quality Assurance: The Contractor shall implement a QA Program for the pretreatment of HLW feed treatment development, qualification, characterization, analysis and certification. The QA program shall be based upon a nationally recognized standard consistent with the Contractor's responsibility for implementing this specification.

12.4 Inspection and Acceptance: The DOE concurred upon *Products and Secondary Wastes Plan*, described in Standard 3, *Product Qualification, Characterization, and Certification*, defines the content and delivery of Contractor documentation required to demonstrate compliance with this specification. Product inspection and acceptance shall be performed in accordance with Section E, *Inspection and Acceptance* and the Contractor's Pretreated HLW QA program.

The Contractor shall describe in the *Products and Secondary Wastes Plan* the procedure for implementing this specification. At a minimum, the procedure shall address the method(s) for obtaining representative samples, determining the HLW solids volume and composition, volume and composition of the HLW supernatant and verification that the conditions in this specification are achieved.

C.7 Interface Descriptions

This Section consists of one Interface Description for each of the interfaces identified in Figure C-1, *Privatization Functions, Inputs, and Outputs*, as listed below. Each Interface Description consists of two parts:

a. A definition of the interface item; and
b. The responsibilities of the Contractor and the U.S. Department of Energy (DOE) or its other Hanford Site contractors.

The Contractor shall comply with the Interface Descriptions.

Interface Descriptions (ID):

ID 1: Raw Water
ID 2: Potable Water
ID 3: Radioactive Solid Wastes
ID 4: Dangerous Wastes
ID 5: Non-Radioactive, Non-Dangerous Liquid Effluents
ID 6: Radioactive, Dangerous Liquid Effluents
ID 7: Non-Dangerous Solid Wastes
ID 8: Liquid Sanitary Wastes
ID 9: Land for Siting
ID 10: Deactivated Facility and Site
ID 11: Electricity
ID 12: Roads
ID 13: Reserved
ID 14: Immobilized High-Level Waste
ID 15: Immobilized Low-Activity Waste
ID 16: Entrained Solids
ID 17: Reserved
ID 18: Reserved
ID 19: Low-Activity Waste Feed
ID 20: High-Level Waste Feed
ID 21: Reserved
ID 22: Air Emissions
ID 23: Waste Treatability Samples
ID 24: Reserved
ID 25: Emergency Response
ID 26: Permits

The DOE will consider requests for additional Hanford Site interfaces/services. However, DOE is not required to provide services beyond that identified in the Interface Descriptions (IDs).

The IDs in Section C.7 provide top-level requirements for each interface. Change control for IDs shall be managed through the Contracting Officer.

Interface Control Documents (ICDs) referenced in the IDs capture all actions required for the interfaces. These ICDs are binding on DOE and the Contractor. ICDs shall be consistent with ID requirements. Change control for ICDs shall be managed as discussed in Section C.2.c.3, *Interface IPT*. Neither the ICDs or the IDs shall relieve DOE or the Contractor from contractual or regulatory requirements described elsewhere in the Contract.

The ICDs shall be updated every six months or more frequently as needed. DOE and the Contractor shall jointly review and concur to the changes to the ICDs following each revision. Any actions identified in the ICDs will be statused at the Interface IPT. Mitigating actions will be identified to ensure activities are completed on schedule.

By 20 months after Authorization-to-Proceed, the updated ICDs shall include details on:

a. Physical Interfaces

1) Location of each hand-off point
2) Interface block diagrams and schematics that clearly define where each interface ends (who owns and maintains what)
3) Type, quantity and composition of material
4) Packaging requirements
5) Design drawings (where appropriate)

b. Administrative Interfaces

1) Procedures that define the hand-off of interface items (who, what, when, where and how)
2) Schedule and logic at the next level of detail from the IDs
3) Documentation necessary for official hand-off of interface items

c. Acceptance Criteria

1) Acceptance Criteria, that is not covered in the Contract, for every hand-off item

Interface Description 1: Raw Water

Interface Definition:

Raw Water - The 200 East Raw Water System provides raw make-up water for process use and for fire water for the 200 East Area. The Hanford Site raw water supply is unfiltered, untreated Columbia River water subject to seasonal changes in temperature and composition.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Provide to DOE any updates and other needed information on the amount of raw water required (average and peak flows) for its process and fire suppression. 2) Connect its facility to the line(s) provided for raw water and fire water at the Contractor's site perimeter. 3) Operate and maintain the portion of those lines that are within the Contractor's own site boundaries. 4) Provide access to DOE for regular inspections of backflow prevention provisions up to the Contractor raw water and fire suppression storage or other service points. 5) Provide to DOE the design for backflow prevention provisions.	DOE or its other Hanford Site contractors will . . . 1) Provide up to 760 liters per minute (lpm) (24-hour average) of process water to the Contractor for operations by February 2003 or per the IMP, whichever is later. 2) Provide and maintain a pipeline for process water to the Contractor's site perimeter. 3) Provide up to a total of 9,450 lpm of fire water. 4) Provide and maintain a pipeline for fire water to the Contractor's site perimeter. 5) Monitor raw water usage. 6) Function as the Site Water Purveyor. 7) Notify the Contractor in advance of scheduled interruption of services. 8) Provide raw water for Contractor's construction activities beginning March 2000 or per the IMP, whichever is later. 9) Approve the Contractor's design for backflow prevention provisions.

Reference: ICD BNFL-5193-ID-01

Interface Description 2: Potable Water

Interface Definition:

Potable Water - The 200 East Sanitary Water System provides potable water for domestic use.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Provide to DOE any updates and other needed information on the amount of potable water required (average and peak flows) for its facility. 2) Connect its facility to the line provided for potable water at the Contractor's site perimeter. 3) Operate and maintain the portion of those lines that are within the Contractor's own site boundaries. 4) Provide DOE the design for backflow prevention provisions. 5) Provide access to DOE for regular inspections of backflow prevention provisions up to the Contractor potable water tank or other service points.	DOE or its other Hanford Site contractors will . . . 1) Provide up to 200 lpm (24-hour average) of potable water to the Contractor by March 2000 or per the IMP, whichever is later. 2) Provide and maintain a pipeline for potable water to the Contractor's site perimeter. 3) Monitor potable water usage. 4) Function as the Site Water Purveyor. 5) Notify the Contractor in advance of scheduled interruption of services. 6) Approve the Contractor's design for backflow prevention provisions.

Reference: ICD BNFL-5193-ID-02

Interface Description 3: Radioactive Solid Wastes

Interface Definition:

Radioactive Solid Wastes - Low-level, low-level mixed, TRU, and TRU mixed solid wastes resulting from the Contractor's treatment of DOE's waste. These wastes will be transferred to DOE for management and disposal.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Estimate the volume, matrix, chemical, radiological, and physical characteristics, and number of radioactive and radioactive mixed solids waste to be generated annually during this Contract and provide these forecasts to DOE. Provide the first annual forecast by July 1999. 2) Submit to DOE all technical information and analyses required to modify or comply with any affected Hanford Site permits necessary to dispose of the waste. 3) Comply with the *Hanford Site Solid Waste Acceptance Criteria* (HSSWAC), WHC-EP-0063, and provide required information to DOE. 4) Package failed LAW and HLW melters to meet the requirements of HSSWAC special case wastes. 5) Provide container and package the radioactive solid wastes in accordance with the HSSWAC. 6) Document that packaged radioactive solid wastes meet the HSSWAC. 7) Transfer the certified radioactive solid wastes to DOE for transportation. 8) Provide facilities for physical transfer and acceptance of the radioactive solid waste. 9) Load transport vehicle. 10) Provide sufficient lag storage for a 60 day interruption of Radioactive Solid Waste transfers and acceptance. 11) Not commingle different types of waste.	DOE or its other Hanford Site contractors will . . . 1) Review the HSSWAC *Waste Certification Summary* and accept certified radioactive solid wastes from the Contractor. 2) Negotiate any necessary modification to Hanford Site permits with the regulator(s). 3) Establish and maintain the HSSWAC. 4) Implement the Waste Verification and Confirmation Program, as defined in the HSSWAC. 5) Provide transportation services and vehicles for transporting radioactive solid wastes to the disposal facility. 6) Notify the Contractor in advance of scheduled interruption of services. 7) Provide, subject to receipt of necessary regulatory permit changes, Radioactive Solid Waste Services for waste feed tank modifications by January 2004 or per the IMP, whichever is later. 8) Provide, subject to receipt of necessary regulatory permit changes, Radioactive Solid Waste services for operations by January 2005 or per the IMP, whichever is later.

Reference: ICD BNFL-5193-ID-03

Interface Description 4: Dangerous Wastes

Interface Definition:

Dangerous Wastes - Non-radioactive, dangerous wastes that are sent to an external RCRA-permitted treatment, storage, and disposal facility rising from the Contractor's treatment of DOE's wastes.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Manage and disposition all non-radioactive, dangerous waste streams. 2) Not commingle different waste types.	DOE or its other Hanford Site contractors will . . . 1) Not accept non-radioactive, dangerous waste from the Contractor.

Reference: ICD BNFL-5193-ID-04

Interface Description 5: Non-Radioactive, Non-Dangerous Liquid Effluents

Interface Definition:

Non-Radioactive, Non-Dangerous Liquid Effluents - Uncontaminated waste water which meets interface acceptance criteria for discharge directly to the 200 Area Treated Effluent Disposal Facility (TEDF).

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Provide to DOE any updates and other information on the operating range for flow rate, volume, pH, conductivity, temperature, and concentration of the transferred liquid effluents. Provide the first annual forecast by July 1999. 2) Submit to DOE all technical information and analyses required for modifications to or compliance with any affected permits necessary to transfer liquid effluents to the 200 Area TEDF. 3) Connect its facility to the line provided for the liquid effluent at the Contractor's site perimeter. 4) Document the volume and composition of discharged liquid effluents and provide this information to DOE. Meet the requirements of the *200 Area Treated Effluent Disposal Facility Interface Control Document*, WHC-SD-W049H-ICD-001, and the *State Waste Discharge Permit*, ST 4502 as amended to include the Contractor's stream. 5) Not commingle different waste types. 6) Provide the motive force for pumping liquid effluents. 7) Provide at least 600 m^3 of storage capacity, or 24 hours of storage capacity, whichever is greater to store liquid effluent production, without impacting Contractor operations.	DOE or its other Hanford Site contractors will . . . 1) Accept from the Contractor up to 300,000 m^3/yr of non-radioactive, non-dangerous liquid effluents corresponding to an average flow rate of 570 lpm. The maximum instantaneous discharge rate that will be accepted is 900 lpm. 2) Provide and maintain a transfer pipeline from the Contractor's site boundary to the 200 Area TEDF. 3) Negotiate with regulator(s) any necessary permit changes associated with the new waste stream. 4) Verify the volume and composition of liquid effluents discharged by the Contractor. 5) Notify the Contractor in advance of scheduled interruption of services. 6) Provide, subject to receipt of necessary regulatory permit changes, Liquid Effluent Services by February 2003 or per the IMP, whichever is later.

Reference: ICD BNFL-5193-ID-05

Interface Description 6: Radioactive, Dangerous Liquid Effluents

Interface Definition:

Radioactive, Dangerous Liquid Effluents - Dilute radioactive and/or dangerous process waste liquid effluents which meet interface acceptance criteria for discharge to the Liquid Effluent Retention Facility (LERF) and/or to the Effluent Treatment Facility (ETF) for subsequent treatment.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Provide to DOE any updates and other information on the operating range for volume, flow rate, activity, and composition of the radioactive, dangerous liquid effluents to be transferred. Provide the first annual forecast by July 1999. 2) Submit to DOE all technical information and analyses required to modify or comply with any affected permits and implementing documents necessary to transfer radioactive, dangerous liquid effluents to the LERF/ETF. 3) Connect its facility to the line provided for the liquid effluent at the Contractor's site perimeter. 4) Document the volume and composition of discharged liquid effluents and provide this information to DOE. 5) Pretreat liquid effluents, if required to meet the negotiated LERF/ETF treatability envelope. 6) Discharge liquid effluents within the current LERF/ETF treatability envelope. 7) Not commingle different waste types. 8) Provide the motive force for pumping liquid effluents. 9) Interlock discharge pumps with LERF/ETF leak detector and control system. 10) Provide at least 1,000 m^3 of storage capacity, or 48 hours of storage capacity, which ever is greater to store liquid effluent production without impacting Contractor operations.	DOE or its other Hanford Site contractors will . . . 1) Specify and update, as needed and practical, the LERF/ETF treatability envelope. 2) Accept from the Contractor and treat up to 100,000 m^3/yr of radioactive, dangerous liquid effluents corresponding to an average flow rate of 190 lpm. 3) Provide and maintain a transfer pipeline compliant with the Dangerous Waste Regulations between the Contractor's site boundary and the LERF/ETF. 4) Compare the predicted effluent characteristics to the LERF/ETF's treatability envelope and determine whether treatability tests or LERF/ETF process modifications are necessary. 5) Verify the volume and composition of liquid effluents discharged by the Contractor. 6) Dispose of secondary solid wastes resulting from waste water treatment at the LERF/ETF. 7) Negotiate with regulator(s) any necessary permit changes associated with the new waste stream. 8) Notify the Contractor in advance of scheduled interruption of services. 9) Provide, subject to receipt of necessary regulatory permit changes, Liquid Effluent Services by August 2003 or per the IMP, whichever is later.

Reference: ICD BNFL-5193-ID-06

Interface Description 7: Non-Dangerous Solid Wastes

Interface Definition:

Non-Dangerous Solid Wastes - Non-radioactive, non-dangerous wastes that are sent to an external treatment, storage, and disposal facility arising from Contractor's treatment of DOE's wastes.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . .	DOE or its other Hanford Site contractors will . . .
1) Manage and disposition all non-radioactive, non-dangerous solid wastes.	1) Not accept non-radioactive, non-dangerous solid wastes.

Reference: ICD BNFL-5193-ID-07

Interface Description 8: Liquid Sanitary Wastes

Interface Definition:

Liquid Sanitary Wastes - Contractor-owned and generated sanitary sewer discharges.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Design, permit, install, operate, and deactivate a sanitary waste treatment system for its needs.	DOE or its other Hanford Site contractors will . . . 1) Not accept liquid sanitary wastes.

Reference: ICD BNFL-5193-ID-08

Interface Description 9: Land for Siting

Interface Definition:

Land for Siting - The appropriate land required in the 200 East Area for waste treatment services. Land for facility siting will be provided to the Contractor under a no-cost lease that authorizes the Contractor to use the property for construction, operation, and deactivation.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Construct, operate, and deactivate its facility within the site boundaries. 2) Maintain spill records. 3) Monitor site for spreadable radioactive debris and dispose of any contamination detected. 4) Monitor site for historical, cultural artifacts, or sites during construction. 5) Stop work for a minimum of three days if any historical, cultural artifacts, or cultural sites are discovered during construction activities. 6) Perform any site characterization required beyond that performed by DOE in Part A. 7) Stop work for a minimum of 30 days or the negotiated duration per the *Native Americans Graves and Repatriation Act* Site agreement negotiated by DOE with local Native American Tribes for any human remains discovered during construction activities.	DOE or its other Hanford Site contractors will . . . 1) Prior to the end of Part B-1, lease a portion (approximately 60 acres) of the site within the region shown in Section J, Attachment 3, *Siting Plan/Aerial View of Proposed Contractor Locations*. 2) Ensure that site-use satisfies requirements through the environmental checklist process at the initiation of Part B. 3) Provide land corridors and required siting information for tank waste transfer lines by October 2000 or per the IMP, whichever is later. 4) Provide necessary analysis, mitigation, and tribal consultation to determine any actions related to any historical artifacts, or cultural sites uncovered during construction by the Contractor. 5) Provide land in February 2000. 6) Provide Contractor site access for planning and characterization.

Reference: ICD BNFL-5193-ID-09

Interface Description 10: Deactivated Facility and Site

Interface Definition:

Deactivated Facilities - Facilities that have been deactivated and are ready for transfer to DOE for surveillance and maintenance, decontamination/decommissioning, and RCRA closure. Facilities to be deactivated include the site (land), Contractor-improvements to the site/land corridors or other Government-furnished property and equipment, transfer pipelines, diversion boxes, and associated components, nuclear processing facilities, and support buildings.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Prepare a final Deactivation Plan by six months prior to deactivation. 2) Deactivate facilities. 3) Establish baseline deactivation conditions through a third party. 4) Transfer deactivated facility(ies) and site to DOE. 5) Provide documentation required by the approved *Deactivation Plan*. 6) Select a mutually agreed independent third-party to confirm Contractor achievement of agreed deactivation end points. 7) Transmit as-built drawings of the Contractor's facilities to DOE at the completion of waste treatment services.	DOE or its other Hanford Site contractors will . . . 1) Authorize facility deactivation. 2) Continue to provide DOE supplied utilities during deactivation. 3) One month after deactivation accept transfer of the deactivated facilities for DOE performance of decontamination, decommissioning and RCRA closure. 4) Select a mutually agreed independent third-party to confirm Contractor achievement of agreed deactivation end points.

Reference: ICD BNFL-5193-ID-10

Interface Description 11: Electricity

Interface Definition:

Electricity - 33 Megawatts (MW) power at 13.8 kilovolts (kV), 60 Hertz (Hz), three-phase alternating current (AC), will be available to the Contractor's site electrical distribution system.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Provide to DOE any updates and other information on the amount of AC power (average and peak loads) required for its process. 2) Notify DOE of changes in load. 3) Maintain coordination of protective devices at interface.	DOE or its other Hanford Site contractors will . . . 1) Deliver up to 33 MW of power at the defined parameters by April 2002 or per the IMP, whichever is later. 2) Deliver power to the Contractor's site perimeter. 3) Monitor power consumption. 4) Maintain electrical distribution at the defined capacity to the Contractor's site perimeter. 5) Notify the Contractor in advance of scheduled interruption of services. 6) Deliver up to 7 MW of power at the defined parameters to support Contractor's construction power needs by October 2000 or per the IMP, whichever is later.

Reference: ICD BNFL-5193-ID-11

Interface Description 12: Roads

Interface Definition:

Roads - The primary roads providing access to the 200 Area.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Provide and maintain roads within its own site boundaries. 2) Notify DOE, in advance, of road closures the Contractor requires outside its boundary. 3) Provide to DOE any updates on the demand on existing Hanford Site roads. 4) Notify DOE, in advance, of any loads or clearances that exceed site transportation limit (Section J, Attachment 4, *Contractor Vehicles and Equipment*).	DOE or its other Hanford Site contractors will . . . 1) Provide road access between the Contractor's site boundary and existing Hanford Site roads by March 2000 or per the IMP, whichever is later. 2) Maintain the existing roads in the vicinity of the Contractor's facility. 3) Manage road closures outside the Contractor's site boundary as necessary. 4) Notify the Contractor in advance of scheduled interruption of services.

Reference: ICD BNFL-5193-ID-12

Interface Description 13: Reserved

Interface Description 14: Immobilized High-Level Waste

Interface Definition:

Immobilized High-Level Waste - Immobilized High-Level Waste (IHLW) sealed in canisters suitable for interim storage and future placement in the federal geologic repository.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Provide a facility for physical transfer and acceptance of the canistered IHLW form. 2) Unload the shipping containers (if necessary) from the transport vehicle, place the IHLW product in accordance with Specification 1, *Immobilized High-Level Waste* in the shipping containers provided by DOE and return the loaded shipping containers to the transport vehicle. 3) Notify DOE that the loaded shipping container is ready for pickup and provide access for DOE's transportation equipment to accomplish the physical pickup. 4) Provide required documentation to DOE. 5) Provide lag storage with a minimum capacity to accommodate 90 days production or 45 canisters whichever is greater.	DOE or its other Hanford Site contractors will . . . 1) Provide clean, approved shipping containers delivered to the Contractor-designated transfer facility. Shipping containers will be provided in accordance with the following: a) Smearable contamination on shipping container (internal and external): <367 Bq/m^2 alpha, and <3670 Bq/m^2 gamma/beta b) Radiation level (when loaded): <200 mRem/hr for shipping container outer surface <10 mRem/hr at a distance of two meters from the vertical surface of the shipping container 2) Accept the IHLW product in accordance with contract specifications, requirements, and procedures. 3) Pickup the loaded shipping container from the Contractor-designated transfer facility. 4) Transport shipping containers: a) Empty - to the Contractor's loading facility b) Full - from the Contractor's loading facility 5) Provide the transport vehicle. 6) Notify the Contractor in advance of scheduled interruption of services.

Reference: ICD BNFL-5193-ID-14

Interface Description 15: Immobilized Low-Activity Waste

Interface Definition:

Immobilized Low-Activity Waste - Immobilized Low-Activity Waste (ILAW) product suitable for disposal on the Hanford Site.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Provide a facility for physical transfer and acceptance of the ILAW product. 2) Unload the shipping containers (if necessary) from the transport vehicle, place the ILAW product in accordance with Specification 2, *Immobilized Low-Activity Waste* in the shipping containers provided by DOE and return the loaded shipping containers to the transport vehicle. 3) Notify DOE that the loaded shipping container is ready for pickup and provide access for DOE's transportation equipment to accomplish the physical pickup. 4) Provide required documentation to DOE. 5) Provide lag storage with a minimum capacity to accommodate 90 days production, or 450 packages, whichever is greater.	DOE or its other Hanford Site contractors will . . . 1) Provide clean, approved shipping containers delivered to the Contractor-designated transfer facility. Shipping containers will be provided in accordance with the following: a) Smearable contamination on shipping container (internal and external): <367 Bq/m^2 alpha, and <3670 Bq/m^2 gamma/beta b) Radiation level (when loaded): <200 mRem/hr for shipping container outer surface <10 mRem/hr at a distance of two meters from the vertical surface of the shipping container 2) Accept the ILAW product in accordance with contract specifications, requirements, and procedures. 3) Pickup the loaded shipping container from the Contractor-designated transfer facility. 4) Transport shipping containers: a) Empty - to the Contractor's loading facility b) Full - from the Contractor's loading facility 5) Provide the transport vehicle. 6) Notify the Contractor in advance of scheduled interruption of services.

Reference: ICD BNFL-5193-ID-15

Interface Description 16: Entrained Solids

Interface Definition:

Entrained Solids - Entrained Solids contained in LAW feed separated from tank waste that may be transferred to DOE via pipeline.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Transfer the Entrained Solids separated from the waste feed envelopes consistent with Specification 3, *Entrained Solids* to DOE by pipeline transfer in accordance with Specification 9, *Liquids or Slurries Transferred to DOE by Pipeline*. 2) Flush the transfer line. 3) Provide required documentation to DOE. 4) Provide lag storage with a minimum capacity of 600 m^3 (and a solids content of 20 wt%) or a minimum of 120 days of production, whichever is greater, assuming the LAW feed is received at 7M Na with or solids content of 2 wt%. 5) Provide a transfer line from the contractor's facility to the interface point described in ID19. A point of connection with the DOE transfer system (adjacent to the AP Tank Farm) to the Contractor's facility. 6) Minimize the quantity of waste returned to the DOE. 7) Interlock waste transfer pipeline leak detection system and transfer pump(s) with the DOE waste transfer controls and leak detection system.	DOE or its other Hanford Site contractors will . . . 1) Receive the Entrained Solids, and transfer line flush water. 2) Notify the Contractor in advance of scheduled interruption of services.

Reference: ICD BNFL-5193-ID-16

Interface Description 17: Reserved

Interface Description 18: Reserved

Interface Description 19: Low-Activity Waste Feed

Interface Definition:

Low-Activity Waste (LAW) Feed - Liquids and Entrained Solids as defined in Specification 7, *Low-Activity Waste Envelopes Definition*, transferred to the Contractor for treatment services.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Request LAW feed in accordance with Clause H.9, *Ordering and Contract Order Quantities*. 2) Prepare waste feed tank and necessary piping up to the interface point to receive LAW feed. 3) Prior to transfer determine acceptability of feed within contract specifications and notify DOE of acceptance. 4) Receive water from the transfer pipeline flush following transfer of waste. 5) Interlock waste transfer pipeline leak detection system and transfer pump(s) with the DOE waste transfer controls and leak detection system. 6) Provide capability for emergency transfer of LAW tank contents back to DOE. 7) Provide pipeline(s) from the waste receipt tank(s) to an interface point at the BNFL site boundary. 8) Using data supplied by DOE or its other Hanford site contractors and performing analysis, as required, perform and document characterization activities as needed on tank waste to verify compliance with treatment facility dangerous waste permits, safety authorization basis and any additional technical needs.	DOE or its other Hanford Site contractors will . . . 1) Select waste envelope and quantity, consistent with Specification 7, *Low-Activity Waste Envelopes Definition*. 2) Provide Contractor with representative samples, if requested of each candidate feed between 270 and 720 days prior to transfer of such waste to the Contractor's facility and no more than 7 days after DOE sampling of the feed batch. 3) Certify and document to the Contractor, per Specification 7, *Low-Activity Waste Envelopes Definition*, prior to the transfer to the Contractor's facility, that the waste quantity being delivered conforms to the LAW feed specifications. 4) Transfer waste feed to the Contractor in accordance with Clause H.9, *Ordering and Contract Order Quantities.* 5) Flush the transfer line. 6) Provide access to available waste characterization information to support BNFL characterization activities. The data may include analytical data and records of the waste generation processes. 7) Provide capacity to receive emergency transfer of tank wastes.

Reference: ICD BNFL-5193-ID-19

Interface Description 20: High-Level Waste Feed

Interface Definition:

High-Level Waste (HLW) Feed - HLW feed as defined in Specification 8, *High-Level Waste Envelope Definition*, transferred to the Contractor for treatment services.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . .	DOE or its other Hanford Site contractors will . . .
1) Request HLW feed in accordance with Clause H.9, *Ordering and Contract Order Quantities*. 2) Provide a transfer line from a point of connection to the DOE transfer system (adjacent to AP Tank Farm) to the Contractor's facility. 3) Receive and store HLW feed from DOE for vitrification. 4) Receive water from the transfer pipeline flush following transfer of HLW. 5) Prior to transfer, determine acceptability of feed within contract specifications and notify DOE of acceptance. 6) Provide HLW feed receipt capacity sufficient to receive up to 600,000 liters of slurry. 7) Interlock waste transfer pipeline leak detection system and transfer pump(s) with the DOE waste transfer controls and leak detection system. 8) Provide capacity for emergency transfer of HLW tank contents back to DOE. 9) Provide pipeline(s) from the waste receipt tank(s) to an interface point at the BNFL site boundary. 10) Using data supplied by DOE or its other Hanford site contractors and performing analysis, as required, perform and document characterization activities as needed on tank waste to verify compliance with treatment facility dangerous waste permits, safety authorization basis and any additional technical needs.	1) Transfer the HLW feed consistent with Specification 8, *High-Level Waste Envelope Definition,* to the Contractor. 2) Provide Contractor with representative samples of each candidate feed, if requested between 270 and 720 days prior to transfer of such waste to the Contractor's facility and no more than 7 days after DOE sampling of the feed batch. 3) Certify to the Contractor, per Specification 8, *High-Level Waste Envelope Definition,* prior to the transfer of the waste to the Contractor facility, that the waste quantity being delivered conforms to the High-Level Waste Feed specifications. 4) Transfer the waste feed to the Contractor in accordance with Clause H.9, *Ordering and Contract Order Quantities.* 5) Flush the transfer line. 6) Provide samples of HLW feed to the Contractor for testing. 7) Provide access to available waste characterization information to support BNFL characterization activities. The data may include analytical data and records of the waste generation processes. 8) Provide capacity to receive emergency transfer of tank wastes.

Reference: ICD BNFL-5193-ID-20

Interface Description 21: Reserved

Interface Description 22: Air Emissions

Interface Definition:

Air Emissions - Gaseous emissions from the operation of waste treatment services that are discharged to the atmosphere as contractor-owned and generated wastes. Includes radioactive and non-radioactive emissions.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Prepare and submit Notice(s) of Construction (NOC) for DOE review and reconcile DOE comments to obtain DOE concurrence. 2) Submit NOC to the State of Washington Department of Health (WDOH), Washington Department of Ecology (Ecology), and U.S. Environmental Protection Agency (EPA) via transmittal through DOE for radioactive and nonradioactive air emissions. 3) Obtain approval of the NOC. 4) Prepare supporting technical information for the NOC. Prepare Air Operating Permit modifications based on regulatory approvals of the NOC and submit to DOE. 5) Collect data and maintain records as required by regulations and/or permit conditions and provide air quality monitoring information from the Contractor stack to DOH and Ecology to satisfy permit requirements and to DOE for inclusion into site-wide permit required reports. 6) Maintain exposure to the maximally exposed individual (MEI) (nonacute exposure) ALARA but not more than 1.5 mrem per year. Review and if necessary request adjustment of allocation from DOE following completion of the permitting activities (NOC approval) and/or following collection of at least one year of sampling and/or monitoring data. 7) Maintain organic emissions from the Contractor facility ALARA but not more than 0.375 tons per year. Review and if necessary request adjustment of allocation from DOE following completion of the permitting activities and/or following collection of at least one year of monitoring data. 8) Limit emissions from the facility to levels agreed to in permits with Ecology and EPA or as otherwise required by law or regulation. 9) Incorporate and proceduralize any conditions and limitations imposed by the regulatory agencies.	The DOE or its other Hanford Contractors will.... 1) Maintain site-wide Air Operating Permit (AOP) and Treatment Storage and Disposal Unit (TSD) permits. 2) Provide access to existing site air quality and meteorological data for Contractor use in preparing the NOC or other compliance documents. 3) Review and concur on the NOC. 4) Seek modifications to site-wide Air Operating Permit based on modification requests provided by the Contractor, when approved by DOE. 5) Use existing monitoring network to collect air samples required by DOE and not collected by the Contractor in the proximity of the Contractor facility during construction and operation. 6) Allocate 1.5 mrem per year exposure to the MEI to the Contractor facility. Review and adjust allocation following completion of the permitting activities (NOC approval) and/or following collection of at least one year of sampling and/or monitoring data. 7) Allocate 0.375 tons per year organic emissions to the Contractor facility. Review and adjust allocation following completion of the permitting activities and/or following collection of at least one year of monitoring data.

Reference: ICD BNFL-5193-ID-22

Interface Description 23: Waste Treatability Samples

Interface Definition:

Waste Treatability Samples - DOE shall provide samples of candidate LAW and HLW to the Contractor for waste treatability studies.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Request samples of candidate low-activity waste and high-level waste feeds to conduct waste treatability studies. 2) Negotiate a schedule for DOE to provide the waste treatability study samples to the Contractor. 3) Ship waste treatability samples from the Hanford site to the Contractor's test facility. 4) Provide DOE a waste residue plan that includes estimates of waste volume and composition, preliminary return schedule, and proposed waste minimization steps. 5) Prepare a waste characterization summary for the return of waste treatability study residues to DOE. 6) Package and transport waste treatability study residues as a solid to the Hanford Site in accordance with the Hanford Site Solid Waste Acceptance Criteria (WHC-EP-0063) within 12 months of receipt of each sample. The Contractor may ship waste treatability study residues as liquids only with prior approval by DOE. 7) Return empty sample carriers, with smearable surface contamination less that 367 Bq/m^2 alpha and less than 3,670 Bq/m^2 gamma/beta, within two weeks (or as negotiated) of receiving the samples.	DOE or its other Hanford Site contractors will . . . 1) Evaluate Contractor requests for waste samples and determine if they will be provided. 2) Provide samples of candidate low-activity waste and high-level waste feeds. These samples need not be compliant with Specification 7, *Low-Activity Waste Envelopes Definition* and Specification 8, *High-Level Waste Envelopes Definition*. 3) Negotiate a schedule for Contractor shipment of waste treatability samples. 4) Review and approve the Contractor's prepared waste characterization summary for the return of waste treatability study residues to the DOE. 5) Receive and dispose of waste treatability study residues.

Reference: ICD BNFL-5193-ID-23

Interface Description 24: Reserved

Interface Description 25: Emergency Response

Interface Definition:

Emergency planning, notification, and reporting for management of radioactive and hazardous materials where there are joint DOE and Contractor responsibilities for planning, preparedness, and response. This interface provides for integration between the contractor's emergency management program and the Hanford Site Emergency Management Program for compliance with local, state and federal regulations to protect worker and public health and safety and the environment in the event of an emergency at or affecting the Hanford Site. This interface covers organization, authorities, and responsibilities and agreements for response to and mitigation of emergency events involving the Contractor's facility and the Hanford Site.

Responsibilities:

CONTRACTOR	DOE
The Contractor shall . . . 1) Develop and implement an integrated Emergency Management Program (EMP) in accordance with applicable requirements. 2) Comply with the *Hanford Site Emergency Response Plan*, DOE/RL 94-02. 3) Integrate the Contractor EMP with the Hanford Site EMP, including coordination of emergency plans and procedures. 4) Develop independent, or enter into existing Hanford Site, agreements with emergency response authorities and providers. 5) Participate in emergency preparedness planning, training, drills, and exercises as required under agreements or law. 6) Ensure adequate acquisition and maintenance of resources essential for emergency response. 7) Respond to emergencies in a timely, effective, and efficient manner ensuring the health of workers and the public, and for protecting the environment and property in the event of an emergency. 8) Identify and provide 24 hour access to key emergency response personnel. 9) Provide annually to DOE the information needed for annual Hanford Site reporting not otherwise covered in Contractor permits. 10) Provide an Emergency Response Interface Control Document 20 months after Authorization-to-Proceed that establishes: a) Administrative procedures and protocols, including necessary agreements, for emergency planning, preparedness, and response. b) Hanford Site services needed for emergency planning, preparedness, and response. c) Contractor participation in RL Emergency Operations Center and Joint Information Center. d) Contractor participation in sitewide notification system for emergency and non-emergency reporting. e) Physical interface for hand-off of emergency response.	DOE or its other Hanford Site contractors will . . . 1) Maintain and implement the Hanford Site Emergency Response Plan and procedures. 2) Provide access to site-wide emergency notification system. 3) Update, as appropriate, Hanford site emergency response implementing procedures to incorporate Contractor notifications. 4) Consider Contractor requests for Hanford Site emergency planning, preparedness, and response resources.

Reference: ICD BNFL-5193-ID-25

Interface Description 26: Permits

Interface Definition:

Waste Permitting and Compliance–Administrative requirements for permitting and compliance related to solid waste management where DOE and the Contractor have joint responsibility[1] including, but not limited to: 1) modification to a DOE held permit for Contractor-owned facilities and 2) modification of a DOE-held permit for acceptance/management of Contractor generated waste.

CONTRACTOR	DOE
The Contractor shall . . . 1) Identify and obtain necessary permits for Contractor operations. 2) Provide as needed information related to Contractor operations for modification or institution of new Hanford Site compliance documents and permits necessitated by Contractor activities. 3) Prepare treatment facility permit application(s) for modification of Permit WA 7890008967. 4) Provide dangerous waste management facility permit application(s) to DOE for review and comment. 5) Revise dangerous waste management facility permit application(s) to reconcile DOE comment(s) and provide to DOE for signature if required. 6) Submit complete dangerous waste management facility permit application(s) to regulator. 7) Revise treatment facility permit application(s) to reconcile regulator comment(s) with DOE concurrence. 8) Provide Contractor data and technical information as required under law, regulations, permit or other such requirement for Hanford Site reporting. 9) Provide support to DOE-led permitting activities. 10) Maintain Contractor compliance-related records for the life of the facility. 11) Provide a Permits Interface Control Document within 12 months after ATP that establishes: a) Routine reporting requirements and associated by administrative interfaces and procedures; and b) Non-routine reporting requirements and associated administrative interfaces and procedures. 12) Identify and obtain DOE agreement for Contractor to enter into any Hanford Site permit other than the Permit WA 7890008967 or the currently proposed Hanford Site Air Operating Permit.	DOE or its other Hanford Site Contractors will . . . 1) Review and comment on treatment facility permit applications(s). 2) Provide Hanford Site information for use in permit application/modification preparation. 3) Provide support to Contractor-led permitting activities. 4) Request modifications of Hanford Site Permits, as appropriate, to incorporate Contractor activities.

[1] *NOTE: Administrative requirements for physical interface descriptions may be elsewhere in the Contract. Tank permitting is addressed in ID 21, air emissions are addressed in ID 22, liquid effluent permitting is addressed in ID 5 and 6.*

Reference: ICD BNFL-5193-ID-26